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Honey as a Functional Food; Its Culinary Status

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ABSTRACT

Using functional foods which are recently a rising value in the food science arouses curiosity in terms of health among people. Honey, as a natural functional food, might play an important role in the increase of this value with a large but conscious use of it in kitchens. Having a prebiotic property with its oligosaccharide components, honey has a characteristic of supporting the increase of probiotic Bifidobacterium and lactobacilli bacteria. In the current study, the culinary status of honey was investigated depending on the views of professional chef trainers. For honey that shows different compositions, chefs point out that, because of the changes of nectars in the flora collected by bees, the qualitative honey bought from local producers could be a more functional food by using it with sauces, milk products like yoghurt and cheese, with such spices as ginger, turmeric, black pepper, and cinnamon at room temperature without an application of heat treatment.

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Introduction

Functional food is the general description of the foods creating positive results for a certain function in human metabolism, a certain organ or a certain disease beside its nutrition property, healing, bearing curative or risk reduction features in diseases, beneficial for human health in short (Sarkar and Candra, 2019).

Honey, a side product of upper respiration-digestion system which honeybee (Apis mellifera) makes by collecting from flower nectars, plants and the secretions of insects living in plants, is a natural food. Having a natural and quite complex chemical structure, honey has a curative effect in a very large field (Oskouei and Najafi, 2013). Chemical structure of honey varies depending on the geography it is collected and botanic variety.

The current study aimed to investigate the culinary status of honey as a functional food. Even though it is considered as a natural functional product, honey applications in kitchen might turn it into a harmful material rather than a useful one. With this study, it is aimed to investigate the use of honey with foods, drinks and spices, benefits, and harms of honey, with what food it goes with well and give recommendations to increase its functional property. The current study was carried out with educator, professional chefs.

Composition and Functional Properties of Honey

The content of honey varies depending on the flora with which honeybee is fed. No honey looks like another one and for that reason, its composition varies. Containing over 200 different ingredients (Oskouei and Najafi, 2013; Mutlu et al., 2015; Yeşilada, 2021), honey is mainly made up of fructooligosaccharides (Chow, 2002) and a great many amino acids, vitamins, minerals, and enzymes (White, 1957).

All natural honeys are composed of flavonoids (apigenin, pinocembrin, kaempferol, kersetin, galangin, chrysin and hesperidin), phenolic acids (ellagic, caffeic, p-coumaric and ferulic acids), ascorbic acid, tocopherols, catalase (CAT) superoxide dismutase (SOD), reduced glutathione (GSH), Maillard reaction products and peptides (Oskouei and Najafi, 2013) and these compounds

give rise to antioxidant by working together (Suarez et al., 2009).

Except for monofloral honeys, "flavonoid" in the honey will release information as to its botanic source. (Yeşilada, 2019).

Phenolic components of honey show its source as well. For instance, rosmarinic acid shows the source of thyme (Thymus sp., Origanum Sp.) and rosemary, ellagic acid shows the source of heather (Erica sp.) (Anklam, 1998).

In general, honey is basically composed of fructose and glucose, components of carbohydrates. Average composition of honey is given in Table 1. (Fiorani et al., 2006; Bogdanov et al., 2008; Yeşilada, 2019).

Glycaemic Index (GI) giving total carbohydrate amount in foods might vary from 32 to 85 depending on the botanic source in honey. There is a negative correlation between fructose content and GI. Low level of GI was determined in honeys like acacia honey which is rich in fructose (Bogdanov et al., 2008).

Prebiotics are obtained with the active intake of such functional foods as oligosaccharides supporting bifidobacteria or compressing harmful bacteria in order to optimal protection of intestinal flora (Mitsuoka, 2014).

Table 1. Average Composition of Honey

Component	Average
Total Carbohydrate	80%
Monosaccharides (Fructose, Glucose)	55%-85%
Disaccharides (Sucrose)	2%-15%
Trisaccharides (Melesitose)	%1-7%
Polyphenol compounds	0.1%-0.2%
Flavanols (Quercetin, kaempferol, galangin, fisetin) Flavanones (Pinocembrin, naringin, hesperidin) Flavones (Apigenin, acacetin, chrysin, luteolin) Phenolic acids, Procyanidins, Kumarins	
Proteic materials Aminoacids Enzyms (glucose oxidase, invertase, amylase, catalase, phosphatase)	0.2%-0.4%
choline	0.3-2.5 mg/kg
acetylcholine	0.06-5 mg/kg
Vitamins and Minerals (average/ 100g)	0.1%-0.5%
Riboflavin (Vitamin B2)	0.038mg
Niacin (Vitamin B3)	0.121mg
Pantothenic acid (Vitamin B5)	0.068mg
Pyridoxine (Vitamin B6)	0.024mg
Folate (Vitamin B9)	2mg
Ascorbic acid (Vitamin C)	0.5 mg
Calcium	6mg
Iron	0.42 mg
Magnesium	2mg
Potassium	4mg
Phosphorus	52mg
Sodium	4mg
Zinc	0.22 mg
Water (average)	20%

Isomalto-oligosaccharides, Fructo-oligosaccharides (Mitsuoka, 2014) and Xylo-oligosaccharides, which are among prebiotic oligosaccharides, are found in honey (Özyurt and Ötleş, 2014).

Effects of Honey on Health

Among functional properties of honey are antibacterial (Mohan et al., 2017), antioxidant (Israili, 2014), antitumour (Nikhat and Fazil, 2022), anticancer (Mutlu et al., 2015; Cianciosi et al., 2018), anti-inflammatory, anti-browning and antiviral (Martos et al., 2008) effects. Phenolic components are responsible for functional properties of a lot of foods such as antioxidant capacity (Almaraz et al., 2007), antibacterial capacity, antiviral capacity and anti-inflammatory capacity (Fiorani et al., 2006).

It is believed that antimicrobial and antifungal effect of honey is based on hydrogen peroxide (Allen et al., 1991), phenolic acid, flavonoid, lysozyme, and catalase obtained through low pH value, glucose oxidase enzyme (Mutlu et al., 2015).

When given to body by capsulation, honey increases the survival ability of Bifidobacterium which is a probiotic bacterium under simulated gastrointestinal conditions (Favarin et al., 2015).

It is indicated that honey inhibits the development of Heliobacter pylori which is the main factor of stomach ulcer and decreases the effect of the disease (Ajibola et al., 2012). In another study carried out over rats, it was found that stomach lesions of the subjects fed with daily honey diet (Zanini et al., 2014). In the use of bee honey with the seeds of black cumin (Nigella sativa L.), it was found that it has protective effects upon hepatoxicity, oxidative stress and carcinogenesis (El-Kholy et al., 2009). However, there could be some reactions varying from simple cough to anaphylaxis in allergic bodies with the consumption of uncontrollably produced honeys and it is necessary to warn in this sense (Martos et l., 2008). It is not recommended to give honey to babies under 1 year of age for the risk of infantile botulism (Arnon et al., 1977).

Studies on Honey as A Functional Food

Honey oligosaccharides are of importance in human digestion (Yao et al., 2003) and have a similar prebiotic effect to that of fructooligosaccharides. Oligosaccharide components lead to a prebiotic effect and an increase in the probiotic bifidobacterial and lactobacilli bacterial activities (Dezmirean et al.,2011). Honey containing isomaltulose prebiotic (Özyurt and Ötleş, 2014) and three-month-old fresh honey contain Bifidus, and Lactobacillus probiotic bacteria and it must be regarded as a functional food alone (Dezmirean et al., 2011).

It was determined in clinical studies that L. acidophilus LA-5, B.lactis BB-12 and B.longum probiotic cultures are balanced in honey and that honey could be consumed as a functional food with yoghurt (Sarkar and Candra, 2019). It is indicated that methyl glyoxal content of the honey from manuka tree in New Zealand is good for gastroenterological system disorders (Yeşilada, 2019). Manuka, honeydew, and thyme honey are effective against prostate cancer cell lines in terms of anticancer activity

(Nikhat and Fazil, 2022). As a new potential functional food, strawberry tree honey decreases the cellular proliferation colon cancer and the ability of forming colonies (Afrin et al., 2019).

Use of Honey as A Functional Food in Kitchens

Honey has a positive contribution in the prevention of microorganism development leading to the spoilage of foods. It has also significant contributions in the prevention of enzymatic darkening of fruit and vegetables and oxidative spoilage.

In a study by Özdatlı et al. (2014) carried out to investigate the use of herbal teas, it was found that melissa tea, black tea, white tea, green tea, sage tea, echinacea, linden, daisy and ginger teas increased the antioxidant effect.

However, adding honey to bakery (cake, cookies etc.) to reduce refined sugar intake might increase the amount of toxic acrylamide in these products to a great extent (Kazancı, 2021).

Hydroxymethylfurfural (HMF) concentrations formed in honey is an indication of overheating, storing in bad conditions or the age of honey (Zappala et al., 2004). HMF concentration must not be over 40 mg/kg in the regulations of Codex Alimentarius Commission (CAC01/25.2000). It is pointed out that application of heat treatment to one flora honeys increases HMF and that becomes harmful by exceeding the intended limit for human health (Güney, 2010).

It was pointed out that using honey with goat yoghurt affects such many features as colour, syneresis, viscosity, organoleptic acceptance and even purchasing intention in a positive way (Machado, 2017), while Martins et al., (2018) expressed that using honey with yoghurt formed a more functional food.

Materials and Methods

Qualitative research methods depend on typical interview and observation and content analysis is considered among basic design components of this research theoretically (Creswell, 2009). Content analysis is based the principle of investigation of written, verbal, and visual messages in terms of certain models and themes (Leedy and Ormrod, 2010).

The content that would define the use of honey, the subject of the current study, as a functional food was reviewed thematically in the related literature and suitable semi-structured questions were prepared, and the interview, a method of qualitative research, was made with the participant professional chefs. Interview results were evaluated over thematic keywords together with their analyses.

Table 2. Open-ended questions asked to the participant in the semi structured interview form

1	Where and how do you use honey in your meals in the kitchen?
2	Where and how do you use honey as a drink in the kitchen?
3	Do you mix honey with spices? (If yes; Spice, Where, Method of Use (By Crumbling, Smashing), Way of Use (Fresh-Dry) (Remark the amount).
4	How do you consider the contribution of honey to your meals as appearance/taste/texture?
5	What are the products you think you use/don't use with honey in the kitchen?
6	What could be the benefits and harms of using honey in the kitchen?
7	With what foods, drinks or spices can honey be matched?
8	Can you share a recipe of a meal (product) you prepared using honey?
9	How do you define honey as a functional food?
10	What are your recommendations for the use of honey in the kitchen as a functional food?

Table 3. Descriptive Information Regarding the Participants.

Code	Gender	Range of Age (year)	Education	Work Experience (year)
P1	Male	26-35	PhD and above	6-10
P2	Male	36-45	PhD and above	11-15
P3	Female	46-55	Master's degree	11-15
P4	Male	26-35	Undergraduate	1-5
P5	Male	36-45	Master's degree	16-20
P6	Female	36-45	Master's degree	11-15
P7	Male	36-45	Primary School	21-25
P8	Male	26-35	Undergraduate	1-5
P9	Male	36-45	Master's degree	16-20
P10	Male	26-35	Master's degree	6-10
P11	Male	46-55	High School	25 +
P12	Male	36-45	Associate	16-20
P13	Female	36-45	Master's degree	6-10
P14	Male	26-35	Master's degree	11-15
P15	Male	36-45	High School	25 +
P16	Male	46-55	High School	25 +
P17	Male	36-45	Master's degree	25 +
P18	Male	36-45	PhD and above	21-25
P19	Female	36-45	Undergraduate	16-20
P20	Male	36-45	Undergraduate	11-15
P21	Male	26-35	Undergraduate	6-10

Table 4. Demographic distribution of the Participants.

Gender	f	%
Male	4	19.0
Female	17	81.0
Age (year)		
26-35	6	28.6
36-45	12	57.1
46-55	3	14.3
Education		
Primary School	1	4.8
High School	3	14.3
Associate	1	4.8
Undergraduate	5	23.8
Master's degree	8	38.1
PhD and above	3	14.3
Experience (year)		
1-5	2	9.5
6-10	4	19.0
11-15	5	23.8
16-20	4	19.0
21-25	2	9.5
25+	4	19.0

The participants of the research were educator chefs professional in their subjects and the interviews were made on social media by reaching 21 people between the dates of October 20th and November 17th, 2021. The content of the questions was arranged 5 close-ended for demographic data and 10 open-ended for the research. The open-ended questions evaluated from the perspective of educator chefs and the content of which was decided over the thematic concepts in the related literature are given in Table 2. Research ethics were considered in all phase of the study.

Results and Discussion

The information of 21 educator chefs participating in the interview is given in Table 3.

Demographic distribution of the Participants is given in Table4.

The question of "Where and how do you use honey in your meals in the kitchen?" was answered by educator chefs, who could give more than one view, as an alternative to sugar in sweets at a rate of 42.9%. Also, 38.1% of them answered it for its binding and texture features in sauces and 33.3.% replied it as in its natural form in breakfasts.

The question of "Where and how do you use honey as a drink in the kitchen?" was answered as in herbal teas at a rate of 28.9%. It was followed by smoothie and Sirkencubin, a traditional Ottoman kitchen drink made of vinegar and honey, as 19.1%. The method of using honey in drinks were in herbal teas, smoothie and in Sirkencubin adding it when it was cooled.

The question of "Do you mix honey with spices? (If yes; Spice, Where, Method of Use (By Crumbling, Smashing), Way of Use (Fresh-Dry) (Remark the amount)" was answered by 95.2% of the chefs as "Yes". In this question which could be answered more than one, the mostly preferred spices among educator chefs were ginger 71.4%, cinnamon 52.4% and black pepper 52.4% respectively. Regarding where it was used, it was found that they used honey in chicken meals (15.8%), in sweets (15.5%), in sauces (13.1%), in drinks (syrup, lemonade, milk) (11.9%), for marination (9.5%), in cakes and cookies (8.3%) and raw in the form of gum like candy (7.1%).

In the method of using spices the most, it was determined that they used them by crushing (48.6), crumbling (41.4%) and both (10.0%). As for their way of use, they expressed that they used them mostly in dry form (64.3%), in fresh form (24.3%) and in both forms (11.4%).

For the question of "How do you consider the contribution of honey to your meals as appearance/taste/texture?", 85.7% of chefs pointed out for appearance that it gave gloss to foods and it was mostly made by spreading on them. As for taste, 42.9% regarded it as a natural sweetener, 14.3% thought it increased flavour and also 14.3% expressed that it added an aromatic feature to the meal. Regarding the use of honey as a texture, 52.4% highlighted the feature of stabilizer and 14.3% indicated the feature of binding in sauces.

In the question of "What are the products you think you certainly use/don't use with honey in the kitchen?", milk and milk products were in the first place in certainly using it at a rate of 23.8%. It was followed by chicken and bakery like cake and cookie as 19.0%. In the expression of "I certainly don't use together", it was found that they did not it with fish and sea products at a rate of 19.0%.

In the question of "What could be the benefits and harms of using honey in the kitchen?", 57.1% expressed that it was beneficial for health, 23.8% said it made a contribution to flavour and 14.3% pointed out that it added a different taste and aroma in meals. As for its harms, 23.8% expressed in the first place that it was overconsumed as it was sugar-frre and 14.3% expressed it was turned into harmful as it lost some characteristics when it was chefed. Those who pointed out that harmful material (like HMF) was formed during heat treatment, and it should not be used in allergic bodies was 9.5%.

The question of "With what foods, drinks or spices can honey be matched?" was answered as chicken and other poultry animals at a rate of 38.1%, red meat with 33.3% and salad sauces (cold, sweet, sour) with 28.6% respectively. In drinks, it was answered herbal teas and linden with 28.6% and 23.8% milk products. As for spices ginger was in the first place with 42.6% and it was consistent with the 3rd question in terms of preference. Other matching spices are as follows; cinnamon with 33.3%, turmeric with 23.8% and black pepper with 23.8%.

The answers given to the question of "Can you share a recipe of a meal (product) you prepared using honey?" was determined as chicken (oven roasted drumsticks Dakgangjeong, with teriyaki sauce with yoghurt and soya sauce), meat foods, herbal tea drinks (basil and lemon) and traditional Ottoman drink "Sirkencubin". Also, "Mahmudiye" made with chicken in Ottoman kitchen and "Sahini" butter and tahini mixture, su muhallebisi (starch pudding with rose water), cookie (with ginger) and its vegetable type (ratatouille).

The question of "How do you define honey as a functional food?" was answered as healthy, useful for health and beneficial with 42.9%. It was also pointed out that it is good for upper respiratory diseases, common cold and sore throat with 38.1%. In addition, 14.3% of the chefs indicated that it boosts metabolism and immune system. The rate of those who said it is good for stomach disorders was 14.9%.

Table 5. Distribution of Using Status of Honey with Spices.

Spices	Ginger								Black Pepper							
Products	Crumbling				Crushing				Crumbling				Crushing			
	Fresh		Dry		Fresh		Dry		Fresh		Dry		Fresh		Dry	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Marination	1	4.8			1	4.8					1	4.8				
Drink (lemonade)	1	4.8														
Drink (syrup)					1	4.8										
Drink (milk)							1	4.8								
Other drinks	1	4.8			1	4.8										
Sauces					1	4.8					1	4.8	1	4.8		
Sweets	1	4.8	1	4.8	1	4.8	2	9.5								
Cookie	1	4.8	2	9.5	1	4.8	2	9.5								
Oath			1	4.8												
Bread																
Meat and chicken dishes	1	4.8	1	4.8	4	19.0	1	4.8			4	19.0			1	4.8
Chocolate											1	4.8				
Gum like candy					1	4.8	1	4.8			1	4.8			2	9.5

Spices	Cinnamon							
Products	Crumbling				Crushing			
	Fresh		Dry		Fresh		Dry	
	f	%	f	%	f	%	f	%
Marination	1	4.8	1	4.8				
Drink (lemonade)								
Drink (syrup)								
Drink (milk)								
Other drinks			1	4.8			1	4.8
Sauces			1	4.8			1	4.8
Sweets	1	4.8	3	14.3	1	4.8	4	19.0
Cookie							1	4.8
Oath			1	4.8				
Bread			1	4.8				
Meat and chicken dishes								
Chocolate								
Gum like candy								

In the question of "What are your recommendations for the use of honey in the kitchen as a functional food? 19.1% of the chefs indicated that it should be consumed raw and in room temperature. Other recommendations where it should be used with spices in the form of cream, in diabetic products, as a cold one in fruit cocktails and in milk products. There were also some other chefs saying that its field of use should be enlarged.

For the use of honey in meals in the kitchen, educator chefs pointed out that they used it in sweets as an alternative to sugar, P7 used it for the sweet-salty balance and for its aroma, P8 used it for the purpose of flavour in sweet sour and sweet hot meals. P9 used it on ice cream, P20 explained that he used it on yoghurt ice cream and drew attention to its use in its natural form. P3, P4, P16 and P18 indicated that they used it in the marination of meat, chicken and fish, expressing that honey increased its functionality by mixing with spices in the process of marination.

As for using honey as a drink in the kitchen, while its use with herbal teas was generally in the forefront, P13 and P16 used it with linden for common cold, P1, P10, P16 and P20 used it in smoothies and P3 used it to sweeten syrups (e.g., basil syrup, honey with ginger, with warm milk) in its cooled form. Syrups are the drinks prepared by boiling various spices and herbs, both in the Ottoman kitchen and current Türkiye, sweetened with products like honey and sugar and mostly consumed in cooled form (Sarıoğlan and Cevizkaya, 2016).

Syrups prepared by various fruit and honeys in the periods of Anatolian Seljuk and Principalities (Beyliks) were the most common drinks. "Sirkecubin" is known as the mixture liked by Mevlana, which was prepared by mixture of whey and wheat with vinegar and honey (Şahin, 2008). The name of Sirkencubin comes from the combination of "sirke" (vinegar) and "encubin" (honey) words in Persian language (Doguer et al., 2021). P1, P3, P6, P20, P21 gave Sirkencubin as an example of drink with honey.

In the mixture of honey with spices, educator chefs used honey with ginger mostly as a fresh drink (syrup) and lemonade, chicken meals, sauces and in marination in milk drink, and as a dry product, it was preferred to use in bakery like cookies and with oat. Other use which is known commonly with black pepper and cinnamon is given in Table 5.

It was pointed out that the products preferred with honey were mustard with sauces, sesame with chicken meals, cumin with meat meals and in marination by crushing and in their dry form.

Regarding the contribution of honey to meals in terms of appearance/taste/texture, majority of educator chefs

were of the same opinion that it gave gloss to foods. P3 was expressed that it gave gloss to cakes and tarts while P8, P19, P21 pointed out that it gave gloss to apple pie as a bakery product after taking it out of oven or on the top of chicken in the oven. P10 indicated that it drew attention in sweet presentations with its bright striking colour.

As for using honey as a taste, P2, P8, P12, P14, P20 pointed out that it made a contribution with its flavour and aroma instead of sugar. Regarding texture, P1, P8, P10, P17, P20, P21 made an emphasis on the stabilizer feature of it in sauces, particularly cold salad sauces. Also, P11 it provided texture in drinks while P18 indicated that it gave softness in bakery products.

The chefs saying that they certainly used honey with another thing pointed out that it matched well with such cheese as divi cheese (P7) and Ezine sheep cheese (P9). There were also some other matches like ricotta, Tulum cheese (cheese wrapped in goatskin), white cheese with no salt. P16, P17, P19 and P21 indicated that it could be used almost everything. While P2 used it to keep the humidity of cake products, for softness and sweetening, P3 pointed out that he wouldn't bring refined sugar and honey, which is not preferred to be used with fish products, together.

The view that it is useful for health is frequently expressed in the category of the use of honey in the kitchen for its benefit. While P7 and P20 pointed out that it improved metabolism and immunity system, P14 highlighted its antioxidant feature and P11 expressed that it could be used with diabetic products. As for its harms, a great many numbers of chefs were aware of the fact that it could be turned into a harmful product when it is exposed to heat treatment. As an example, P6, P8 and P17 drew attention to the fact that a harmful (cancerogenic) material occurs in exposition to heat treatment and P9 indicated that it is HMF. P14 emphasized that it would lead to cancerogenic materials and loss of nutrient value at high temperatures in the oven and P16 highlighted its harms when it is cooked with fish at high temperatures. In addition, P18 warned about its allergenic feature and P9 and P19 indicated that it should be used more carefully in younger age groups because of its allergic character.

In terms of accompaniment of honey with food products, P6 pointed out that it was a product mostly used in this kitchen in salad sauces, intensive cheeses or as a natural sweetener while P12 expressed that it was a good match with ginger, green apple, black pepper and lemon as a winter tea and used it so often. P16 indicated that it could be used with ginger, turmeric and almost all spices.

In the recipes of products made with honey, it is usually added as a last step while cooking or after the product is cooled. Among these recipes could be given as Sahini, Mahmudiye, Su Muhallebisi (starch pudding with rose water) and Sirkencubin which are thought to be original Ottoman tastes. Also, Sebzeli Türlü (Ratatouille), which is a cold healthy extra-virgin olive-oil recipe, could be added in these recipes.

In Sahini, 100g butter in room temperature is mixed with 200g tahini and 150g extracted honey, and it is served cold. It is pointed out that it could be consumed by spreading on yeasted bakery like bread.

Mahmudiye is an Ottoman pan meal made with chicken and dry fruits. The ingredients are as follows: 1kg chicken breast, 100g dry apricot, 100g almond, 50g dry raisin, 1 teaspoonful cinnamon, 2 spoonful honey, 1 medium onion and 1 lemon, 70ml extra virgin olive oil and salt, and for the decoration, 4-5 sprigs of dill and parsley. Chicken breast is chopped in small parts and boiled in 500 ml water. The water is kept for later use. Boiled chicken is fried in olive oil until they nearly turn into pink. Cubic chopped onions are added onto it and cooked for 1-2 minutes. Peeled almonds, dry raisin, dry apricots, cinnamon, juice of one lemon are all added into half a litre chicken water. It is cooked at low heat with cap closed for 30 minutes. After resting for sometimes, honey is added and mixed. Finely chopped dill and parsley are put at the top and served.

In Su Muhallebisi, honey and rose water are added as a sauce (instead of powdered sugar). Four hundred ml water and milk are put with 100g corn starch in a pan and mixed uninterruptedly until it boils. After it starts boiling, it is left to cook for 1-2 minutes more. It is shared in cold bowls and it is rested for 2 hours in the fridge when it comes to room temperature. Honey and rose water are added before it is served.

In Sirkencubin, 100ml apple vinegar, 1 stick cinnamon, 2 pieces of cloves are boiled in 1 liter of tap water for 5 minutes. When the mixture becomes warm, 100 g honey is added into it and mixed well. This syrup is consumed in its warm or cold form but one glass a day (those who have a stomach disorder should consume it carefully).

Sebzeli Türlü (Ratatouille) is made up of onion, carrot, squash, rosemary, honey, garlic, extra virgin olive oil, salt and black pepper. Finely-chopped vegetables are tempered in olive oil for a short time and softened. Salt and black pepper are added when it is near to cook with honey and soda addition. It is cooked for 1-2 minutes more by mixing it and left to rest.

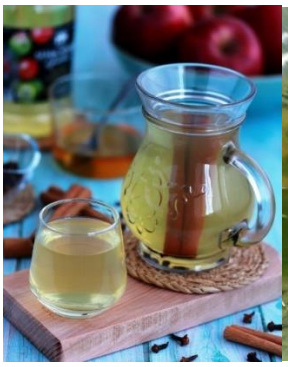
Honey as a functional food should generally be used in the kitchen in its natural form without making it exposed to heat treatment. P1, P6, P12 and P18 recommended that it should be consumed raw in order to have a maximum benefit. P17 maintained that its use in the place of sugar should be increased, and it should be used in cold salads and sauces with extra virgin olive oil in its cold form.

Even though there is an awareness in general sense in its healthy use in educator chefs, high cost of qualitative honey prevents its use in the kitchen to a large extent.

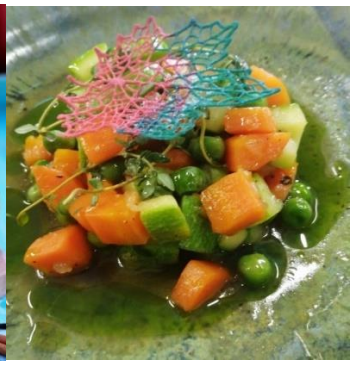
Picture 1. Sahini (Hakan Güleç)

Picture 2. Mahmudiye (Murat Özalper)

Picture 3. Su Muhallebisi (Murat Özalper)



Picture 4. Sirkencubin (Hakan Güleç)



Picture 5. Sebzeli Türlü (Sezer Özdemir)

Conclusions

Increasing the benefits of honey on human health could only be made with the accumulation of scientific data over the culture of using it. In this sense, particularly kitchens and educator chefs have a great responsibility. Not boiling honey and using it its natural form is of great importance due to the fact that it could lead to harmful HMF and Acrylamide. Also, its use with various spices, adding it to milk products such as yoghurt, milk cream and cheese, conscious use of it with such common spices as ginger, turmeric, black pepper, and cinnamon would increase its functional feature.

It is not true that honey will never spoil. Even though it varies depending on its types when exposed to heat treatment, in the preservation of it over 55 °C or in room temperature mostly 4 years, 40 mg /kg HMF value, which is the limit stipulated by Codex Alimentarius Commission, is exceeded (Güney, 2010). Honey should be preserved in room temperature, in glass jars without being exposed to direct sunlight and in a covered way.

Also, upon the consideration that it is a carbohydrate-based product, consuming it more with an idea that it is useful could naturally pose a threat for human health. In addition, using it mistakenly and unconsciously in the kitchens will be harmful for allergic bodies and it should be used more carefully at babies. It is also important to bear in mind that excessive consumption of it with the idea that it is a healthy food could put human health into danger.

Since honey is made by bees collecting nectars from different plant floras and varies in terms of its content, it is particularly of importance to use it in the kitchens with well-known brands. At this stage, supporting local honey producers and in line with it enriching our kitchens with honey products with geographical indications would increase the functional food characteristics of these products. As it is a valuable product, it is also important to be careful about its fake and tricky types and producers should follow it carefully over CAC regulations.

Honey is used in our kitchens in red and poultry meat, salad and sauces, in bakery like cake and cookies, milk products like cheese and yoghurt, in marination processes, in drinks like syrup, smoothie and herbal teas with spices and in many other ways and methods.

When it is not cooked out of rules in the kitchens and used in a way that it will not lose its aroma, it is a product that can be used in a healthy way.

Knowing that there are some potential harmful materials for human health in unconscious uses like boiling and exposing to excessive heat treatment, it is necessary to be away from fake and tricky products and to support the qualitative products of local producers.

As shown in scientific studies, we can make honey, which is already a natural functional product, more functional in gastronomy by using it with such kind of milk products as yoghurt and ice cream, with herbal teas and common spices.

With the current study, it is believed that the awareness of using honey in a healthy way in the kitchen will increase and a new point of view will be attained to gastronomy.

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