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Chapter

Utilisation of Honey in Processed Food Products

Neha Babbar, Parv Bansal, Poonam Aggarwal, Kulwant Singh and Sukhpreet Kaur

Abstract

Honey is a unique food owing to its rich composition. Honey consumption in the diets dates back to older times where it was used as a remedy for stomach aches, dehydration, allergies, intercellular damage, skin and hair problems, as well as for its astringent. Honey is used in several food formulations these days. The majority of population is demanding partial or complete replacement of sugar with some healthy sweeteners. Honey is one of the replacers offering so many benefits from being sweet to therapeutic. The unique healing properties of honey such as antiseptic, antibacterial and antiviral are well recognised. By harnessing the unique benefits of honey for formulating healthier products is very beneficial for overall nutrition and well-being. Many honey-containing products such as honey candy, honey spreads, honey bread, honey yoghurt and honey flakes have been prepared which showed increased therapeutic potential. Also, honey-containing beverages are becoming popular owing to its natural sweetness. Honey offers great scope for the development of value-added products or as an ingredient in several formulations.

Keywords: antiviral, therapeutic, astringent, nutrition, formulation

1. Introduction

Modern fast living has directly influenced eating habits, which has had a number of detrimental effects on health. Unambiguously stating how food is connected to both good and bad health, the quote 'Food is associated to gratification, thus the compromise between pleasure and health is a dilemma' and is highly intriguing [1]. Growing consumer knowledge has resulted in a shift towards functional food consumption and an expansion of the market for these health foods. As a result, there are now more and healthier dietary options available. Honey is a wonder food that not only tastes good but also has many health advantages. It is well recognised that honey contains bioactive substances that have antioxidant capabilities, either on their own or in combination with other food ingredients. Honey is nature's gift to the mankind. It is a superfood with distinct qualities, a delicious flavour and health advantages. One of the most well-known uses for honey is as a remedy for stomach aches, dehydration, allergies, intercellular damage, skin and hair problems, as well as for its astringent, cosmetic and antiseptic, antibacterial and preservative effects

Honey added products	Characteristics	References
Gummy candies	Sucrose was replaced with honey Developed using honey and propolis extract Higher antioxidant capacity	Rodríguez-Zevallos et al. [2]; Rivero et al. [1]
Honey hard candies	Honey as a source of sugar and nutrients Optimal amount of honey was 29% to prepare honey candies	Sahlan et al. [3]
Beetroot candies	Developed using honey and sugar syrup of 30°Brix A progressive increase in TSS was attained up to 70°Brix	Bhattarai and Kusma [4]
Honey-fruit candies	Prepared by the process of osmotic dehydration Temperature: 60°C Sucrose concentration: 100:13 Time: 420 min Solution to fruit ratios: 2:1 Obtained better results by using sucrose and honey mixture as an osmotic solution.	
Guava honey spread	Vital ingredients are sugar, acid, pectin, guava and honey Prepared by using 1:2 honey: guava pulp Shelf life of more than 150 days Increased nutritional value	Parihar and Kumar [5]
Goat meat spread	Higher protein content Increased spread ability Boosted cooking yield Obtained best results on the addition of 3% honey in terms of flavour, texture, appearance, adhesive power, aftertaste, spread ability and overall acceptability	Raziudin et al. [6]
Honey malt spread	Prepared by using different levels of honey	Dianat et al. [7]
Honey flakes	An effective substitute for liquid honey Almost perfectly matched the flavour, colour, and aroma of real honey. Shelf life of more than a year when stored at room temperature. No observable flavour or colour loss if the product clumped during storage	Umesh Hebbar, Rastogi and Subramanian [8]
Honey osmo-dried apple pops and rings; apple choco shots and apple pie	Better antioxidant activity Excellent energy value Better quality	Sharma, Vaidya, and Gupta [9]
Addition of honey to beverages	Enhanced the nutritional content Better phenolic compound profile Boosted good sensory acceptability Increased catechin contents Enrichment of quercetin was observed	da Silva et al. [10]; Leite et al. [11]
Addition of honey to yoghurt	The average protein content increased Increased nutritional value Synthesis of more amino acids	Shuwen et al. [12, 13]
Addition of honey to bread	Enhanced nutritional, sensory and preserving qualities of bakery products Boosted the dough's ability to ferment or combine Improved the freshness of bakery products Prevented them from ageing 5–10% honey powder was used for best results	Tong et al. [14]

Honey added products	Characteristics	References
Addition of honey to muffins	Improved volume Significant variation in colour, texture and flavour	Ramya and Anitha [15]
Addition of honey to biscuits	Increased adhesiveness of dough Improved organoleptic properties	Conforti and Lupano [16]

Table 1.
Development of different honey-enriched products and their characteristics.

on people and food. Modern consumers are choosing to switch to healthier and tastier products as they become more and more aware of the underlying reasons of bad health. The consumer prefers processed food products that completely or partially replace sugar with honey over those that only contain sugar. The baking, beverage and confectionary industries use honey extensively. Many processed food items that include honey are discussed in the chapter, along with their health advantages. **Table 1** gives a detailed information on the utility of honey in different processed products.

2. Confectionary foods containing honey

Confectionary items are all time and everyone's favourite. To increase the nutrition through confectionary, many researchers have included honey as an ingredient in confectionary food items especially candies and toffees. Rodríguez-Zevallos et al. [2] created gummy candies with an intention to decrease the glycemic index wherein the sucrose was replaced with honey. Rivero et al. [1] developed gummy candies using honey and propolis extract. A higher antioxidant capacity was observed in gummy candies prepared with honey when compared with commercial counterparts. Sahlan et al. [3] prepared honey hard candy using honey as a source of sugar and nutrients along with glucose syrup, water and sucrose as the main components. The addition of honey by 29% was found to be optimal for the development of honey candy. In another study, beetroot was candied using 30°Brix sugar syrup and honey. After boiling and draining the syrup for a few days, a progressive increase in TSS was attained up to 70°Brix, and it was eventually dried at $55 \pm 3^\circ\text{C}$ [4].

Osmotic dehydration was used to prepare herbal gooseberry candies with honey as the main ingredient [17]. Several researchers have found better results by using sucrose and honey mixture as an osmotic solution. Bawa and Gujral [18] examined the impact of sucrose and honey solution on solid growth and water loss. It was discovered that the agents' concentrations in the soak solutions at room temperature as well as the rate of moisture loss in the fruit vary. The sensory evaluations revealed that samples treated with honey had better flavour while samples treated with sugar had higher colour and general appeal. In comparison to other samples treated with honey and sucrose separately, pineapple sample cubes treated with honey sucrose solution (1:1) at 50°C temperature were shown to have better rehydration features and the lowest moisture content value [19]. The sample that contained both sucrose and honey (50°C) received the highest scores after sensory analysis of all the samples. After osmotic dehydration, samples with sugar and honey had the highest ascorbic acid level. As a result, the sample treated at 50°C with a solution of sucrose and honey turned out to be the best in terms of nutritional value, shelf stability and all other measured characteristics [19].

3. Honey spreads

The creation of honey spreads is a result of rising consumer demand for items containing honey. When making honey spreads, different vital ingredients such as sugar, acid and pectin are mixed together and heated under controlled conditions. Sandwiches and bread are where honey spreads are most commonly used. The addition of fruits to honey-based spreads increases the value of the product and promotes greater product variety [8]. Parihar and Kumar [5] prepared guava honey spread using 1:2 honey:guava pulp, and the spread had a shelf life of more than 150 days and also showed increased nutritional value. Goat meat spread is another example of a honey spread; it demonstrated a significantly higher protein content, spreadability and cooking yield with the addition of more honey. In terms of flavour, texture, appearance, adhesive power, aftertaste, spreadability and overall acceptability, spread containing 3% honey scored much higher than other spreads [6]. Dianat et al. [7] prepared honey malt spread using different levels of honey. Tekiki et al. [20] prepared honey spread by using olive oil and honey.

4. Honey flakes

It has been demonstrated that a variety of honey-based products, such as honey flakes, function effectively as substitutes for liquid honey in a variety of circumstances [8]. Turkot et al. [21] described a method for creating cold-roller-based honey flakes. In this process, a liquid honey was rapidly concentrated in an agitated thin-film evaporator, either in its pure form or with the addition of sucrose syrup, in a continuous manner. Based on an organoleptic analysis of the product, the inventors assert that the regenerated honey almost perfectly matched the flavour, colour and aroma of real honey. The item had a shelf life of more than a year when stored at room temperature. Although the product clumped during storage, no observable flavour or colour loss was noted [8].

5. Honey candy

Another well-liked consumer good is honey candy. Honey candies are typically made with numerous additional components and are used as health foods or as cough and asthma treatments [22, 23]. However, as many of the inventions are secret in nature, there is not much information available about how honey candy is made. In one of the often used techniques, the honey, sugar, water and butter mixture is boiled until it hits the hard crack stage, and then it is poured over a glazed surface to make honey candy [8]. Tadao [23] registered a method for making honey candies that involved heating (between 120 and 150°C) a mixture of honey, granulated sugar and corn syrup to obtain a uniform viscous liquid, which was then rolled to make a rod with royal jelly in the middle. Li et al. [22] developed a technique for making a honey candy that could be used for the treatment and prevention of cough and asthma. Before being packed in pre-sterilised bags, a mixture of plant materials (29 items), containing turnip, peach kernel, walnut kernel, pear and almond, was combined with honey and condensed to achieve the appropriate viscosity. There are number of ingredients, which can be added to produce candy with different tastes. These ingredients included milk powder, soy milk, cinnamon, peanuts, corn starch, oats, dry fruits, nuts, pecans, lemon rinds, coconut gratings, vanilla and corn flakes [8].

6. Bread containing honey powder

One of the most popular foods consumed worldwide is bread, which is also one of the ancient techniques ever discovered [14]. As new methods, instruments and devices are developed, this technology has in fact been continuously changing [24]. The idea of incorporating honey in bread preparation is not new. Many research studies had concluded that the nutritional, sensory and preserving qualities of bakery products are enhanced by adding honey powder to the dough when making them. The rheological characteristics of dough were also significantly impacted. Honey powder made the crust golden brown and the crumb yellow, boosted the dough's ability to ferment or combine and kept baked goods moister and fresher for longer. Therefore, utilisation of honey powder improved the freshness of bakery products and/or prevented them from ageing [14]. In an experiment, it was discovered that only a specific range was considered excellent for the softening of dough. For example, 5–10% is a desired range of honey powder to be used in dough to generate higher-quality bread with looseness and tenderness. Any deviation from this range deformed the bread quality. For instance, less than 5% caused a reduction in softening, and more than 10% weakened the intention of the dough and resulted in problems with stickiness during kneading, made the dough difficult to work with [14].

7. Honey as a functional ingredient in yoghurt

The emergence of functional dairy products, which essentially offer health advantages in addition to their basic ingredients, is a result of the recent public interest in healthier diets. Due to its positive connotations with health, yoghurt is the most widely consumed fermented milk product [25]. The addition of honey increases the nutritional value of yoghurt. 4.49% fibre, 3.15% protein, 0.32% ash, 2.73% fat, 20.54% total solids and 5.3108 Cfu/ml of lactic acid bacteria were found in 10% honey-infused maize yoghurt [26]. Because of the synthesis of amino acids brought about by the interaction of honey components with yoghurt cultures during fermentation, the average protein content of yoghurt increased from 3.15% to 4.34% with increase in concentration of honey from 0 to 10% [12, 13].

8. Other products

Ramya and Anitha [15] incorporated honey in muffins from coconut in various concentrations. The resulted muffins had improved volume and organoleptic evaluation of the muffins revealed a significant variation in the characteristics of colour, texture, flavour and overall acceptability. Conforti and Lupano [16] developed biscuits with incorporation of lemon juice, honey and two concentrations of whey protein and studied the effect of these on structural and functional properties of biscuits. The results showed the increased adhesiveness of dough in sample made from lemon juice and whey protein concentration as well as improved organoleptic properties of biscuits. In an another study by Sharma, Vaidya and Gupta [9], Golden Delicious apples were osmo-dried and utilised to make apple rings and pops, which were then used to make premium products such as apple chocolate shots and apple pie. Honey being rich in phenols and flavonoids resulted in better antioxidant activity with excellent energy value of the developed products. The apple choco shots

and apple pie prepared from honey osmo-dried pops and rings were found better in quality with energy value of 430.09 kcal/100 g and 260.74 kcal/100 g, respectively. Thus, the developed technology can be commercially explored at industry level for the production of quality osmo-dried apple pops, apple rings, apple choco shots and apple pie.

Honey enhances the nutritional content of the beverage and makes it taste sweeter since it includes vitamins, minerals and bioactive chemicals that are nutritionally superior to sugar and sweeteners such as p-coumaric and caffeic acids [10, 27, 28]. Honey has lately demonstrated promise antiviral activity against infections that cause severe respiratory syndromes as well as possible molecular action against coronavirus. It may also improve the inflammatory state of obesity [29, 30]. Although there was no discernible change in colour, the inclusion of honey increased the total soluble solids contents, DPPH (62%), TEAC (72%) and FRAP (20%) values. Comparing the honey mixed beverages with the control mixed beverage, the honey-mixed beverages showed a better phenolic compound profile, with an increase in catechin contents and an enrichment of quercetin, as well as boosting good sensory acceptability [11].

9. Conclusion


With the increase in awareness among the consumers, the demand for functional foods is also increasing. The full or partial replacement of sugar with honey results in a healthier processed product. Many products substituted with honey have shown considerable increase in nutritional value. There is a great scope of using honey in the food processing industry.

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