



E-ISSN: 2709-9385
 P-ISSN: 2709-9377
 JCRFS 2024; 5(1): 99-102
 © 2024 JCRFS
www.foodresearchjournal.com
 Received: 10-12-2023
 Accepted: 17-01-2024

Mohammed Aadil Kashif

M.Tech, Department of
 Agricultural Engineering,
 Maharashtra Institute of
 Technology, Aurangabad,
 Maharashtra, India

Dr. DT Bornare

Ph.D. Scholar, HoD and
 Associate Professor at MIT
 Aurangabad, Department of
 Agricultural Engineering
 Maharashtra Institute of
 Technology, Aurangabad,
 Maharashtra, India

Dr. SG Jaiswal

Ph.D. Scholar, Assistant
 Professor at Maharashtra
 Institute of Technology,
 Aurangabad, Department of
 Agricultural Engineering,
 Aurangabad, Maharashtra,
 India

Correspondence**Mohammed Aadil Kashif**

M.Tech, Department of
 Agricultural Engineering,
 Maharashtra Institute of
 Technology, Aurangabad,
 Maharashtra, India

Formulation of infused honey and its utilization in cookies: A review

Mohammed Aadil Kashif, Dr. DT Bornare and Dr. SG Jaiswal

DOI: <https://doi.org/10.22271/foodsci.2024.v5.i1b.132>

Abstract

This review examines the development and biochemical analysis of tulsi (*Ocimum sanctum*) infused honey and its incorporation into cookie production. Honey, rich in nutrients and antioxidants, serves as an ideal medium for infusing tulsi's bioactive compounds. Tulsi, renowned for its medicinal properties, enhances the nutritional and therapeutic value of honey. The review emphasizes their synergistic effects, highlighting benefits through combination. Introducing tulsi-infused honey into cookies not only enhances health benefits but also adds unique flavours and natural sweetness. This innovative approach meets the rising demand for functional foods. The review addresses formulation challenges and balances health benefits with consumer acceptability. Overall, integrating tulsi-infused honey into cookies offers a promising strategy to enhance nutritional profiles and therapeutic potential, opening avenues for future research in functional food products.

Keywords: Tulsi, cookie production, antioxidants, honey composition

Introduction

Honey is a sweet and yellow coloured sticky substance obtained from honey bees (*Apis mellifera*, *Apis cerana indica*, and *Apis mellipede*), similar to flower nectar which has been consumed since the dawn of time. It produces 1.25 lakh million tons in 2021 year reported by Food and Agriculture Organization (FAO). Honey is known for its high nutritional value and health-promoting properties, this is due to the presence of approximately 200 different substances. The major group of substances contains sugars and water, also proteins (enzymes), organic acids, vitamins (particularly vitamin B6, thiamine, niacin, and pantothenic acid) and minerals (such as calcium, copper, iron, magnesium, manganese, phosphorus, potassium, sodium, and zinc). It contains bioactive compounds mainly phenolic compounds, pigments, volatile compounds and many more other solid particles, Alqarni *et al.* (2012) [1]. Pontes. Honey has antibacterial activity due to the presence of glucose oxidase and catalase enzyme, which produces hydrogen peroxide, it is an antibacterial agent (Gallmann *et al.* 2008) [7]. The above-mentioned compounds are present in significant amount which are responsible for most of its positive activity. Bogdanov *et al.*, (2008) [7] studied the recommended dietary allowances of honey nutrients per healthy persons in which the vitamin C content is 2.2 to 2.5 mg per 100 gm, antioxidant activity which is range from 3 to 16.95TE/g, total phenol content range from 46 to 796 GAE mg/kg and it also work on chemical analysis. The term "oxidative stress," imbalances the production of free radical and that's how it provides antioxidant activity to honey. After consumption of a specific amount of honey (70 g), it reduces inflammation in inflammatory bowl diseases, when they studied its effect on rat and developed experimental model (Sieber *et al.* 2008) [7]. The proper consumption of honey provide therapeutic effect and can be used to treat many diseases (Sharma *et al.* 2020) [5].

History of Honey

Honey, produced by various species of bees (*Apis mellifera*, *Apis cerana indica*, and *Apis dorsata*), is a natural sweet substance derived from the nectar of flowers. Its use dates back to ancient civilizations, where it was not only consumed as a sweetener but also employed in medicinal and religious contexts. According to the Food and Agriculture Organization (FAO), global honey production reached approximately 1.25 million tons in 2021. Honey's high nutritional value is attributed to its complex composition, which includes sugars, water,

proteins, organic acids, vitamins, minerals, and a plethora of bioactive compounds like phenolics and flavonoids. These components confer honey with various health-promoting properties, including antimicrobial and antioxidant activities, largely due to enzymes such as glucose oxidase and catalase, which produce hydrogen peroxide, a potent antibacterial agent.

Nutritional and Non-Nutritional Components of Honey

Honey's nutritional profile is dominated by carbohydrates, which constitute 95-97% of its dry weight, primarily in the form of fructose and glucose. It also contains proteins, vitamins, amino acids, minerals, and organic acids. Notable bioactive compounds in honey include flavonoids and polyphenols, which contribute to its antioxidant capacity. Approximately 31 minerals have been identified in honey, including major ones like phosphorus, sodium, calcium, potassium, and magnesium. The presence of volatile compounds, enzymes, and organic acids further enhances its nutritional and therapeutic potential. The diverse composition of honey varies significantly depending on its floral source, geographic location, and environmental conditions.

Health Benefits of Honey

Honey boasts a plethora of health benefits, including antimicrobial, anti-inflammatory, and antioxidant properties. Its consumption has been associated with enhancements in cardiovascular health, lowered blood pressure, and improved cholesterol profiles. With a low glycemic index, honey is a preferred sweetener for individuals managing type 2 diabetes, as it leads to a gentler increase in blood sugar levels compared to refined sugars. Moreover, honey's antibacterial attributes have long been utilized in traditional wound healing practices, aiding in tissue regeneration. Its therapeutic potential extends to addressing respiratory issues, gastrointestinal disorders, and various skin conditions, rendering it a versatile natural remedy.

History of Tulsi

Tulsi (*Ocimum sanctum*) holds significant importance both in medicinal and culinary realms, with roots tracing back over 3000 years in Ayurvedic medicine. Renowned for its antispasmodic, carminative, galactagogue, and stomachic properties, tulsi aids in addressing a spectrum of ailments such as stomach cramps, gastric catarrh, vomiting, intestinal catarrh, constipation, and enteritis (Opamudra *et al.*, 2020) [2]. Studies by Chahar (2017) [10] and Bhadra (2020) [6] indicate that tulsi extract exhibits efficacy in controlling glucose levels and improving insulin metabolism, consequently reducing fasting blood sugar levels. Oleanolic acid and β -caryophyllene beta carotene present in tulsi confer antioxidant effects, combating cell damage. Several investigations suggest that regular consumption of specific amounts of basil extract, twice daily, may contribute to alleviating severe acute respiratory syndrome (SARS). Traditionally, tulsi finds application in preparing herbal teas, in the form of dried powder, fresh leaves, and in combinations with honey or ghee. Numerous studies highlight tulsi's potential as a contemporary pain reliever due to its anti-inflammatory activity attributed to the presence of an appropriate concentration of eugenol. For more than three millennia, Tulsi, also recognized as Holy Basil, has played a pivotal role in Ayurvedic medicine.

Its acclaimed adaptogenic qualities assist the body in managing stress and fostering overall well-being. Tulsi abounds in phytochemicals such as oleanolic acid and β -caryophyllene, contributing significant antioxidant benefits. Historically, tulsi has been utilized to address various health issues, spanning respiratory disorders, digestive ailments, and even skin conditions. Its integration into daily rituals, whether through herbal infusions, fresh leaves, or extracts, underscores its broad acknowledgment and utilization for improving health.

Benefits of Tulsi

Tulsi provides a wide range of health benefits

- **Immunity Boost:** Packed with Vitamin C and zinc, tulsi enhances the immune system.
- **Respiratory Support:** Compounds such as camphene and eugenol make it effective against colds and coughs.
- **Stress Reduction:** Contains Ocimumosides A and B, which help balance neurotransmitters and alleviate stress.
- **Cardiovascular Health:** Lowers blood lipid levels and is rich in antioxidants.
- **Diabetes Management:** Aids in reducing blood sugar levels and managing type 2 diabetes.
- **Kidney Health:** Lowers uric acid levels, helping to prevent kidney stones.
- **Digestive Aid:** Improves digestion and relieves gastrointestinal issues.
- **Skin Care:** Antioxidants in tulsi help prevent acne and other skin conditions.
- **Oral Health:** Its antimicrobial properties make tulsi effective in oral care products.
- **Insect Repellent:** Naturally deters insects and pests.
- Incorporating tulsi into honey products, especially in cookie production, is an innovative way to enhance the nutritional and therapeutic value of everyday foods. This combination not only addresses the rising consumer demand for natural and functional foods but also provides an easy method to include the health benefits of tulsi and honey in the diet.

Review of literature

Nutritional Benefits of Raw Material

Honey's chemical composition includes various nutrients and minerals essential for health. According to Shahrajabian *et al.* (2019), honey contains moisture (21.31±0.30%), ash (1.43±0.03%), crude protein (0.58±0.04%), crude lipid (0.25±0.03%), crude fiber (1.41±0.05%), dry matter (78.69±0.30%), and nitrogen-free elements (96.36±0.005%). Micro minerals present in honey include iron (1.32±0.03%), manganese (0.03±0.001%), zinc (0.24±0.01%), and copper (0.14±0.01%), with significant amounts of calcium (5.06±0.09%), magnesium (0.28±0.02%), sodium (2.46±0.02%), potassium (6.78±0.06%), and phosphorus (2.87±0.04%). Diaz *et al.* (2020) [4] reported that honey's moisture content ranges from 15.50 to 18.90%, with a pH range of 3.2 to 4.5, free acidity from 14.17 to 16.83 meq/kg, and enzyme activity of 20.86 to 23.11 μ mol/min (Gothe scale). Kaushal *et al.* (2020) [5] noted that fructose (32.56 to 38.2%) and glucose (28.54-31.3%) are the primary sugars in honey, while sucrose and oligosaccharides are present in trace amounts. The ratio of fructose to glucose is 2:1:1:0. The presence of various minerals, including aluminium, barium,

strontium, and others, contributes to honey's biological activity.

Kaushal *et al.* (2020) ^[5] reported that the fructose (32.56 to 38.2%) and glucose (28.54-31.3%) are the major sugars whereas sucrose, oligosaccharides are minor and in trace amounts present in honey. The ratio of fructose to glucose is 2:1:1:0. The minor and major minerals present in honey (Aluminium, Barium, Strontium, Bismuth, Tin, Tellurium, Thallium, Antimony, Chromite, Nickle, Cobalt, Phosphorus, Sulfide minerals, Calcium, Magnesium, Potassium, Sodium, Zinc, Iron, Copper, Manganese) play an important role in biological activity.

Bhadra (2020) ^[6] reported composition of fresh tulsi leaves which contains 4.2 g of protein, 0.5 g of fat, 2.3 g of carbohydrate, 25 mg of calcium, 287 mg of phosphorus, 15.1 mg of iron, 25 mg of edible portion, vitamin C per 100 g. Whereas in tulsi powder 5.52% of moisture, 2.96% of protein, 20.3% of fat, 13.8% of ash and 0.98% of fiber reported by Patil *et al.* (2018). Tulsi has high therapeutic effect due to the presence of cineole, camphene and eugenol in it.

Bioactive Components Present in Raw Material

Bogdanov *et al.* (2008) ^[7] studied honey's anti-inflammatory effects, noting significant reductions in plasma concentrations of thromboxane, PGE, and PGF after consumption. These findings suggest honey's potential in decreasing inflammatory bowel diseases. Bhadra (2020) ^[6] highlighted that honey contains saponins, flavonoids, triterpenoids, and tannins, which contribute to its biological activity.

Bhadra (2020) ^[6] reported that saponins, flavonoids, triterpenoids, and tannins are the primary elements of holy basil's stem and leaves that may have biological activity. The phenolic compounds exhibit antioxidant and anti-inflammatory properties due to the presence of rosmarinic acid ((2R)-2-[[[(2E)-3-(3,4-Dihydroxyphenyl)-1-oxo-2-propenyl]]oxy] apigenin (5,7-dihydroxy-2(4-hydroxyphenyl)-4H-1-benzopyran-4-one), cirsimaritin (5,4'-dihydroxy-6,7-dimethoxyflavone), isothymusin (6,7-dimethoxy-5,8,4'-trihydroxyflavone), isothyminin (6,7-dimethoxy-5,8,4'-trihydroxyflavone), orientin (8-C-beta-glucopyranosyl-3',4',5,7-tetrahydroxyflav-2-en-3-one), and vicenin (6-C-beta-D-xylopyranosyl-8-C-beta-D-glucopyranosyl apigenin). These compounds were found to protect human blood cells from radiation-induced chromosomal damage.

Niraula *et al.* (2019) ^[8] investigated the phenolic and flavonoid content in various plant extracts. They found that the methanol extract of *O. sanctum* contained a substantial amount of total phenolic content, measuring 180.21 ± 0.89 mg GAE/g. Furthermore, the methanol extract exhibited the highest average flavonoid content at 67.11 ± 0.43 mg QE/g, followed by chloroform and hexane extracts. The polarity of the solvents appears to influence the concentration of total phenolic content (TPC) and total flavonoid content (TFC). The high levels of phenolic and flavonoid compounds in the plant contribute to its ability to neutralize free radicals and function as an antioxidant. The methanol extract's IC50 value was determined to be $47.73 \mu\text{g/mL}$, which is comparable to the standard dosage of vitamin C at $41.34 \mu\text{g/mL}$, indicating strong antioxidant activity. The methanol extract of *O. sanctum* demonstrated the highest concentrations of TPC (180.21 ± 0.89 mg GAE/g dry

extract) and TFC (67.11 ± 0.43 mg QE/g dry extract). The significant antioxidant activity of the methanol extract can be attributed to the presence of phytochemicals such as flavonoids, polyphenols, and tannins. Previous studies have confirmed that these compounds possess notable antioxidant properties.

Health Benefits of Raw Material

Sharma *et al.* (2020) ^[9] studied that honey is commonly used with other substances to minimise the impact of specific diseases. Honey is employed effectively as wound healing, skin ulcers and gastrointestinal health everywhere the planet with honeys from different sources.

Devina *et al.* (2020) ^[5] reported that honey reduces the incidence of radiation mucositis in cancer patients who have undergone radiation treatment. Honey was given to the patients undergoing radiation therapy for head and neck cancer. When honey-treated patients were compared to controls, there was a significant reduction in symptomatic grade 3/4 mucositis, i.e., 20% versus 75%. Compliance was higher in the honey-treated group than in the controls. In comparison to the controls, 55% of the honey-treated patients showed no change or a positive weight gain.

Bhadra *et al.* (2020) ^[6] reported that basil is beneficial to human health, carminative, galactagogue, and stomachic. It treats stomach cramps, gastric catarrh, vomiting, intestinal catarrh, constipation, and enteritis. It was sometimes used to cure whooping cough as an antispasmodic. Tulsi is an effective antioxidant to lower blood sugar levels. Tulsi aids in the decrease in total cholesterol. As a result, people with heart disease benefit from it. The leaves are a nerve tonic and memory enhancer.

Sethi *et al.* (2020) reported that ailments in children's common pediatric problems such as cough, cold, fever, diarrhoea, and vomiting respond well to basil leaf juice. If chicken pox pimples take their time showing up, basil leaves blended with saffron will help speed up their appearance. The basil leaves contain large amount of antioxidant and phenol content which plays important role in above diseases (problems). The phenol content help to boost immune system of our body and prevent certain diseases.

Chahar (2017) ^[10] studied that the *Ocimum sanctum* and reported it's a diverse set of pharmacological properties. Basil contains antioxidants, such as beta carotene, which help to prevent cell damage. Numerous experimental studies have shown Tulsi's ability to protect against the harmful toxins; this study demonstrated its ability to prevent liver, kidney, and brain injury caused by pesticides and industrial toxins. Chewing leaves helps to relieve cold and flu symptoms. In the event of influenza, a decoction of tulsi leaves, cloves, and salt provides immediate relief. Before consuming tulsi root, it should be crushed and cooked with turmeric powder. SARS can be cured by taking two teaspoons twice daily (severe acute respiratory syndrome). By balancing blood sugar and insulin metabolism, it can lower fasting blood glucose levels.

References

1. Alqarni AS, Owayss AA, Mahmoud AA, Hannan MA. Mineral content and physical properties of local and imported honey in Saudi Arabia. *J Saudi Chem. Soc.* 2014 Sep;18(5):618-25.
2. Opamudra S, Preetha B. A review paper on Tulsi plant

- (*Ocimum sanctum* L.). Indian J Nat Sci. 2020;10(60).
3. Shahrajabian MH, Sun W, Cheng Q. Clinical aspects and health benefits of ginger (*Zingiber officinale*) in both traditional Chinese medicine and modern industry. Acta Agric Scand Sect B Soil Plant Sci. 2019 Nov 2;69(6):546-556.
 4. Moumeh B, Garrido MD, Diaz P, Peñaranda I, Linares MB. Chemical analysis and sensory evaluation of honey produced by honeybee colonies fed with different sugar pastes. Food Sci. Nutr. 2020 Nov;8(11):5823-31.
 5. Sharma B, Devina V, Kaushal M, Pratapsing S. Utilization of honey for functional food product development. Acta Sci. Nutr. Health, 2020, 4(4).
 6. Bhadra PA. Review paper on the Tulsi plant (*Ocimum sanctum*). Indian J Nat. Sci. 2020;10(60):20854-208560.
 7. Bogdanov S, Jurendic T, Sieber R, Gallmann P. Honey for nutrition and health: A review. J Am Coll. Nutr. 2008 Dec;27(6):677-689.
 8. Pathak I, Niraula M. Assessment of total phenolic, flavonoid content and antioxidant activity of *Ocimum sanctum* Linn. J Nepal Chem. Soc. 2019;40:30-35.
 9. Sharma J. Studied that honey is commonly used with other substances to minimize the impact of specific diseases. J Food Qual.; c2020.
 10. Chahar S. Tulsi (Holy Basil): Benefits and supplements. J Res. Pharm. Sci., 2017 Aug, 3(8).