

Development of herbal lollipop incorporated with honey and ginger (*Zingiber officinale*)

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Abstract

Spicey, pungent ginger (*Zingiber officinale*) is a herb that's utilised in food and medicine. Both traditional medicine and scientific research support the use of ginger as a remedy for sore throats. In numerous ways, ginger may soothe sore throats. For instance, as an anti-inflammatory, it might offer a little pain relief. Additionally, it increases resistance to infections that lead to sore throats. Even more benefits of ginger for sore throats exist. This article describes how to take ginger and the advantages of using it to cure and relieve a sore throat. For more than 200 years, Traditional Indian Medicinal has employed ginger as a spice and medicine. It is a significant plant with numerous therapeutic and dietary benefits that are employed in Asian and Chinese Traditional Medicine. Ginger has long been used as a herbal remedy to treat a variety of symptoms, such as nausea, pain, and cold symptoms. This is because ginger contains general compounds like Fe, Mg, Ca, vitamin C, flavonoids, phenolic compounds sesquiterpenes, and paradols. It's simple to ingest and offers many advantages ginger and honey blend. According to Ayurveda, this honey and ginger combination has been used for a very long time to cure respiratory issues like a cold and a cough. The different health advantages of ginger can also be delivered to the body through honey. Both honey and ginger have their own distinct health advantages, such as antioxidant capabilities and digestive aids, which is why combining the two results in additional advantages. Herbal lollipops benefits are natural pain killer, benefits the heart, helps with indigestion, prevents morning sickness.

Keywords: Ginger; Honey; Evaluation; *E coli*; Antifungal Activity

1. Introduction

The only sweetener that may be used and kept exactly as it is created in nature is honey. Before consuming this, there is no refinement or processing required. Honey is the sweet, thick substance that honeybees create from plant nectar. This straightforward definition does not include honeydew honey, which is made by the bee from honeydew that various insects that feed on plants emit. The wax that the bees produce which requires 8–10 times its weight in honey to produce is used to build the combs (White Jr, Jonathan W. "Honey." Advances in food research - 1978). Honey's microorganisms may affect its quality or safety. Honey is a product with a low variety and concentration of microorganisms because of its natural features and industry-wide controls. A confectionary gel is made consisting of high-sugar ingredients like sucrose and glucose syrup, gelling agents like starch, gelatin, or pectin, as well as flavourings, colours, and food acids (Marfil et al. 2012; Burey et al. 2009). Yeasts and spore-forming bacteria, which are frequently found in honey, coliforms and yeasts, which indicate the commercial or hygienic quality of honey, and microbes that, under certain circumstances, could make people sick, are all causes for concern in post-harvest treatment (Snowdon, Jill A., and Dean O. Cliver "Microorganisms in honey." 1996). Ginger is popularly consumed in the form of ginger ale or ginger sticks. If these are consumed while travelling, the traveller inhales a herb that treats motion sickness, albeit

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unconsciously. Several excellent clinical investigations have conclusively demonstrated the effectiveness of ginger rhizome in preventing nausea, dizziness, and vomiting as symptoms of motion sickness (kinetosis), as well as in treating postoperative vomiting and pregnancy-related vomiting. Scientific research supports the use of this traditional medication for digestive issues (stimulation). Currently, the major purpose of medicinal ginger is to prevent motion sickness symptoms (E Langner, S Greifenberg, J Gruenwald - *Advances in therapy*, 1998). Researchers looked at the anti-inflammatory, analgesic, antipyretic, antibacterial, and hypoglycemic effects of an ethanolic extract of *Zingiber officinale* rhizomes. The extract decreased fever and paw swelling brought on by yeast in rats, but it had no effect on the writhing brought on by intraperitoneal acetic acid. In rabbits, the extract reduced blood sugar levels. Both Gram-positive and Gram-negative bacteria had a considerable inhibition in their growth. Using rat peritoneal leucocytes, a dose-dependent suppression of prostaglandin release effect was seen (N Mascolo, R Jain, SC Jain, F Capasso - 1989). It has been demonstrated that honey and ginger both possess antioxidant properties that can scavenge reactive oxygen species (ROS). This study's major objective was to assess the antioxidant and anti-diabetic properties of ginger, gelam honey, and their mixture (NF Abdul Sani, LK Belani, C Pui Si - *BioMed Research* 2014). Using a mixture of herbal remedies is more effective for preventing the emergence of resistant bacteria. According to *in vitro* findings from this study, the combination of ginger and honey has a sizable synergistic antibacterial action against isolates from carious teeth (RV Patel, VT Thaker, VK Patel - *Asian Pacific Journal of Tropical* 2011). One of the natural remedies frequently used to cure illnesses that are resistant to conventional medications is honey. Yet, its high cost makes it an unaffordable substance in underdeveloped nations. Our findings suggest that honey could be reduced in amount while still having the desired effect by adding starch to comprehend which starch would be used for whatever mould, more research must be done (A Moussa, D Noureddine, A Saad, A Hebbet - *Int J Microbiol* 2011). This might be a viable substitute for synthetic antifungal agents, but the expense of honey in some countries prevents widespread use. In addition to being a significant source of energy, starch is a key ingredient in many cuisines and is crucial to the coarse texture or consistency of many food preparations (M Ahmed, N Djebli, SM Hammoudi, S Aissat... - *Asian Pacific journal of* 2012). All around the world, the usage of spices and honey is acknowledged for its valued role in medical treatment. These are natural compounds that have typically undergone safety testing and been shown to be beneficial against a variety of human-useful conditions. The iron, calcium, and phosphorus-containing fresh ginger rhizome has 2.3% protein, 12.3% carbohydrate, 2.4% fibre, and 1.2% minerals. Moreover, it includes niacin, thiamine, riboflavin, and vitamin C (Barasch et al., 2004).

1.1. Honey

The parasitic mites that attack honey bees have spread to become a major issue. They are endangering managed and wild honey bee populations, the beekeeping sector, and many agricultural crops' futures due to the importance of bees in pollination (Eickwort GC 1988. The origins of mites associated with honey bees). The principal pests are *Acarapis woodi*, *Varroa jacobsoni*, and *Tropilaelaps clareae*, however honey bees are also related with 100 largely benign mite species (Robaux P. 1986. *Varroa et Varroasis*).

1.1.1. Honey Health Benefits

The desire in using natural food products with practical features to improve human health has grown. Honey may have biological effects that are beneficial to health, such as antioxidant, antibacterial, and anti-inflammatory qualities. Honey has the potential to serve as an important source of antioxidants in human nutrition because of its naturally occurring antioxidants, which are primarily phenolic compounds. As a result, honey can have positive effects on human health, such as being anti-mutagenic, anti-tumor, and cardiovascular protection (H Scepankova, JA Saraiva, LM Esteve - *Bee products-Chemical* 2017). Honey has been utilised as a traditional Ayurvedic medicine for over 4,000 years. At that time, it was believed to be useful in balancing the body's three humours. Honey was regarded by the ancient Vedic civilisation as one of nature's most amazing gifts to humans. Honey was applied topically to cure wounds in ancient Egypt (Megan Ware LD. *Honey: Health Benefits, Uses and Risks*, 2015).

1.1.2. Nutritional Composition of Honey

Protein

Honey bees and/or plants may be the source of honey protein. The nectars gathered from various floral pollens may be the source of honey's plant origin (Baroni MV, Chiabrandi GA, Costa C, Wunderlin DA 2002). Somehow, the amount of protein from plant origin was found to be lower than that from honey bees (Baroni MV, Chiabrandi GA, Costa C, Wunderlin DA 2002). It's also interesting to note that the type and quantity of protein in honey are always dependent on the species of bees and the environment (Lee DC, Lee SY, Cha SH, Choi YS, Rhee HI *Korean J Food Sci* 1998). Moreover, the presence of honey protein has been used as an internal benchmark for the detection of adulteration using stable carbon isotope ratios. Pure honey's carbon isotope ratio changes when cheap sugars are added, but the protein makeup

remains unaltered. Bees produce honey protein naturally by breaking down pollen and nectar using enzymes (White JW, Winters K (1989) J Assoc Off Anal Chem).

Fructose in Honey

Natural remedies like honey have antibacterial, antihypertensive, hepatoprotective, hypoglycemic, and antioxidant properties (Tan, H.T.; Rahman, R.A.; Gan, S.H.; Halim, A.S.; Hassan, S.A.; Sulaiman, S.A.; Kirnpal-Kaur, B. 2009). The sweetest sugar or sweetener that is naturally occurring and readily available is fructose. Compared to glucose, which has a glycemic index of 100, it has a glycemic index of roughly 19 (Bantle, J.P. Dietary fructose and metabolic syndrome and diabetes. *J. Nutr.* 2009). Contrary to glucose metabolism, all of these catalytic events happen without the help of insulin, and fructose metabolism also skips the rate-limiting stages (Mayes, P.A. Intermediary metabolism of fructose. *Am. J. Clin. Nutr.* 1993).

Glucose in Honey

Fructose, glucose, and water make up the three main ingredients of floral honey, making up, on average, 38.2, 31.3, and 17.2% of the total. The only monosaccharides found in honey are glucose and fructose. These two sugars are mixed in different ways to generate the di- and trisaccharide fractions of floral honey (LW Doner - *Journal of the Science of Food and Agriculture*, 1977). This study has shown that the hydrolysis of higher sugars can result in the creation of monosaccharides as a mechanism that predominates over reversal. The evolution of the fructose and glucose content of honey samples and their pH were not statistically related (MM Cavia, MA Fernández-Muiño, E Gömez-Alonso - *Food chemistry*, 2002). Honey is a valuable traditional natural source of energy and sweetness for people. The current study developed a procedure for determining two significant monosaccharide sugars (glucose and fructose) in honey utilising normal phase partition liquid chromatography and a 1-5% mixed working standard of glucose, fructose, and sucrose (MA Kamal, P Klein - *Saudi journal of biological sciences*, 2011).

Minerals in Honey

Minerals of all kinds are typically found in honey. 95 samples with known geographic and botanical origins were examined to look for any potential contamination from regular air pollution or other sources. It was discovered that the majority of components substantially related with electrical conductivity. Pb and Cd, two hazardous elements that were assessed in our investigation, have minimal levels of contamination.

Table 1 Average Composition of Honey

Component	Average (%)
Water	~17
Fructose	~32.56-38.2
Glucose	~28.54-31.3
Other Sugar	~9.8
Proteins	~0.3
Dietary Fibre	~0.2
Free acid as Gluconic	~0.4
Lactone as gluconolactone	~0.2
Total acid as gluconic	~0.6
Ash	~0.2
Nitrogen	~0.04
Minerals	~0.2
PH	~3.2-4.5

Source: Allsop KA, Miller JB. Honey revisited: A reappraisal of honey in preindustrial diets. *Br J Nutr* 1996 and Murty KR. Ashtangahridayaya Samhita, 2001.

Only in terms of Fe and Cr content did the honeys generated in the various regions differ from one another. Other trace elements examined in this study included Cr, Ni, Cu, Zn, Mn, and Fe; their quantities were comparable to those in previous recent investigations (S Bogdanov, M Haldimann, W Luginbühl... - *Journal of Apicultural*, 2007). Despite being tiny components of honey, minerals and heavy metals are crucial in defining its quality. The chemical components of honey are identified using a variety of analytical techniques (M Solayman, MA Islam, S Paul, Y Ali... *Reviews in Food*, 2016).

1.2. Ginger

Ginger is popularly consumed in the form of ginger ale or ginger sticks. If these are consumed while travelling, the traveller inhales a herb that treats motion sickness, albeit unconsciously. Several excellent clinical investigations have conclusively demonstrated the effectiveness of ginger rhizome in preventing nausea, dizziness, and vomiting as symptoms of motion sickness (kinetosis), as well as in treating postoperative vomiting and pregnancy-related vomiting. Scientific research supports the use of this traditional medication for digestive issues (stimulation). Currently, the major purpose of medicinal ginger is to prevent motion sickness symptoms (E Langner, S Greifenberg, J Gruenwald - *Advances in therapy*, 1998).

1.2.1. Ginger Health Benefits

The plant family Zingiberaceae includes ginger. From ancient times, it has been used to cure conditions like arthritis, stomach distress, asthma, diabetes, and menstrual irregularities in Asia, India, Europe, and the Middle East. There is scientific proof that ginger may reduce nausea and vomiting caused by pregnancy, surgery, cancer treatment, or motion sickness, as well as hints that ginger may lessen pain and inflammation. Studies on cell cultures have revealed that ginger has antioxidant qualities (K Singletary - *Nutrition Today*, 2010). Nigeria accounts for 56.23% of the world's total area covered with ginger, followed by India (23.6%), China (4.47%), Indonesia (3.37%), and Bangladesh (2.32%) (Dhanik et al. Citation 2017).

Table 2 Nutritional composition of ginger (per 100 g)

Constituent	Value
Moisture	15.02 ± 0.04
Protein (g)	5.087 ± 0.09 (5.98)
Fat (g)	3.72 ± 0.03 (4.37)
Insoluble fibre (%)	23.5 ± 0.04 (30.0)
Soluble fibre (%)	25.5 ± 0.04 (30.0)
Carbohydrate (g)	38.35 ± 0.1
Vitamin C (mg)	9.33 ± 0.08 (10.97)
Total carotenoids (mg)	79 ± 0.2 (92.96)
Ash (g)	3.85 ± 0.61 (4.53)
Calcium (mg)	88.4 ± 0.97 (104.02)
Phosphorous (mg)	174 ± 1.2 (204.75)
Iron (mg)	8.0 ± 0.2 (9.41)
Zinc (mg)	0.92 ± 0 (1.08)
Copper (mg)	0.545 ± 0.002 (0.641)
Manganese (mg)	9.13 ± 0.01 (10.74)
Chromium (µg)	70 ± 0 (83.37)

Source: (Sandeep S. 2017. Commentary on therapeutic role of ginger)

Table 3 Active chemical constituents of ginger

Phenols	Volatile- Sesquiterpenes	Others
Gingerols and Shogoals	Bisapolene,	6-dehydrogingerdione,
	Zingiberene,	Galanolactone,
	Zingiberol,	Gingesulfonic acid,
	Sesquiphellandrene,	Zingerone,
	Curcurmene	Geraniol,
		Neral,
		Monoacyldigalactosylglycerols,
		Gingerglycolipids

Source: (Kathi JK. 1999. Ginger (*Zingiber officinale*). The Longwood Herbal Task Force).

1.2.2. The most important benefits of ginger

Relieves nausea, Treats cold and flu, Removes excess gas, Aids in proper digestion, Reduces arthritis pain, Stomach ulcers, Liver protection, Relives asthma, Prevents obesity, Improves cognition, Prevents cancer, Relieves muscle pain, Prevents menstrual cramps, Controls diabetes, Boosts heart health, Prevents infection, Detoxifies the body, Skin care, Treats diarrhoea, Increases sexual activity, Improves brain function, Regulates blood sugar (Mohamad Hesam Shahrajabian, Wenli Sun & Qi Cheng 2019).



Figure 1 Natural Honey



Figure 2 Ginger and Ginger Powder

2. Materials and Method

2.1. Materials

- Water
- Sugar
- Liquid Glucose
- Honey
- Ginger flavour
- Black salt
- Ginger powder
- Pectin

2.2. Methods



Step 1: Take 250gm Sugar and 250gm Liquid glucose in a small bowl. And mix well.



Step 2: Add 20ml Honey and 45ml Water in a bowl. Stir the mix until properly not mixed.



Step 3: Prepared raw materials bowl is prepare for heating treatment. Place the prepared item on a hot stove to heat it (Temperature between 140°C to 145°C).



Step 4: Check the temperature with a lollipop thermometer.





Step 5: Cooking stop and 110°C to 115°C for cold treatment. Then added Ginger flavour, Ginger powder, Pectin and Black salt and mix well. And 100°C room temperature down treatment.



Step 6: With a teaspoon, fill the lollipop moulds, and put a lollipop stick in it.



Step 7: Let the lollipops cool for at least 15 minutes before removing them from the moulds or using a spatula to pry them from the baking sheet. They're ready to eat.



Step 8: Package your lollipops in clear or coloured wrappers. Tie each with a ribbon or string. Pack all the prepared lollipops last in a small plastic bag.

3. Result and Discussion

The ginger powder-based herbal lollipops underwent a successful test. The produced formula also contains sugar, methyl cellulose, citric acid, ginger powder, clove powder, and ginger powder, all of which have various medical applications. They have antifungal characteristics. The herbal lollipops' physical and organoleptic properties were evaluated. It was found that the lollipop was clear, firm, and colourless.

Antifungal tests show that ginger powder efficiently and swiftly destroys fungus. The anti-inflammatory and antifungal components of ginger roots are called gingerols and shogaols, respectively. When your body detoxifies the Candida overgrowth, ginger greatly assists your liver. A polymer called methylcellulose thickens and emulsifies liquids. It is neither toxic nor allergic. Citric acid is commonly used as a flavour, an acidifier, and a chelating agent.

Thus, the herbal lollipops' inclusion of ginger and clove powder will have a curative impact on oral thrush.

Table 4 Treatment Table

Sr. No.	Sample Code	Colour	Aroma	Taste	Flavour	Appearance	Overall Acceptability
1	S0	7	7	7	7.5	8	7.5
2	S1	8	7.5	7.5	8	8	8
3	S2	8	7	7	7.5	7.5	7.8

Table 5 Composition of Developed Herbal Lollipop

Component	Value(100gm)
Protein	0 g
Vitamin	0 g
Total Fat	0 g
Sodium	5 g
Sugar	76 g
Total Carbohydrates	96 g
Saturated Fat	0 g

Moreover, sucking on lollipops promotes saliva production, which helps with remineralization. The herbal extracts are also exposed to the teeth for the maximum amount of time due to the volume and rate of dissolving. A lollipop's distribution strategy is strengthened by the fact that it disintegrates more slowly (10–15 minutes) than the other candy types we looked at. To develop a formula in which the herbal extracts were combined with candy syrup at a temperature and time that produced the least amount of harm to their bioactivity, we experimented with a number of formulations and production methods with Dr. John's Candies (Hu, J He, R Eckert, X Wu, L Li, Y Tian, R Lux... - ... journal of oral science, 2011).

The measurement of diameter and thickness was done using five lollipops. Using a vernier calliper, the diameter and thickness of the lollipops were measured. It was determined what the average value and standard deviation were (Shrikanth Parepalli, Madhusudan Rao Y "Formulation And Evaluation of Levodropopropizine Lozenges", World Journal of Pharmaceutical Research, 2015).

4. Conclusion

The current study was designed to "Development of herbal lollipop incorporated with honey and ginger" was undertaken to explore the potential utilization of honey, through innovative food product development.

Making a herbal lollipops is a quick and simple technique. The herbal lollipops can offer a tasty, different approach to treating pain in young children. The most popular drug delivery method in terms of patient compliance, simplicity of administration, and formulation versatility is oral administration. An excellent dosage form for paediatric patients is a herbal lollipops. This will provide an improved, novel dose form. Enjoy a crucial role in pharmacy, where it will stay in the future.

Chocolate, snack bars, candy and sugar confectionery, gum and mint, and supermarkets/hypermarkets, convenience stores, pharmacies, online retail, and other channels make up the various segments of the global market for medicated confectionery. The study also offers an overview of the global markets for medicated confectionery, including those in North America, Europe, Asia-Pacific, South America, the Middle East, and Africa.

This study reports the creation of a herbal lolly that can eradicate bacteria that cause cavities. The investigations demonstrated the safety of these sugar-free lollipops and the stability of their antibacterial properties in the delivery formulations. A quick application of these lollipops (twice daily for 10 days) resulted in a notable decrease in cavity-causing bacteria in the oral cavity among the majority of the human subjects examined, according to two pilot human trials.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that there is no conflict in general. .

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