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Exploring the Potential of Garlic-Manuka Honey Candy as Nutraceutical

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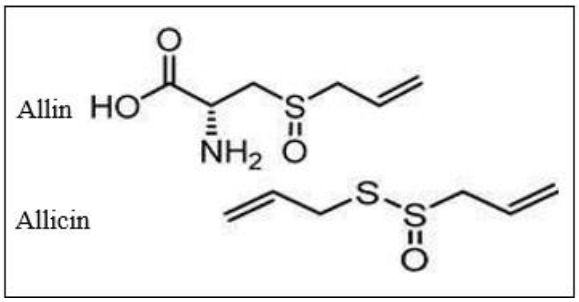
Abstract: ***It is clear that garlic has been a food product used all over the world. It is now an essential component of our diet. Researchers from all over the world have demonstrated the medical benefits of garlic in the treatment and prevention of specific illnesses. It has both therapeutic and preventive qualities; the use of it to stop cancer and heart attacks is receiving more attention lately. It is rich in proteins. Garlic can be categorized as a nutraceutical by looking into these characteristics. This study aims to formulate the Garlic candy having nutraceutical value by error and trial method. A well - known ingredient i. e., Cardamom was used as Flavouring Agent so as to enhance elegance of candies. It will be evaluated for its physical, chemical as well as physicochemical properties along with mechanical properties.***

Keywords: Nutraceutical, Manuka Honey, Candy

1. Introduction

Nutraceuticals, a portmanteau of "nutrition" and "pharmaceutical, " refer to food - derived products that offer health benefits beyond basic nutrition. Coined by Dr. Stephen L. DeFelice in 1989, the term encompasses food ingredients that support human and animal life, offering scientifically proven health benefits, including disease prevention and treatment. Nutraceuticals can range from dietary supplements to food extracts marketed as medicines. These products are designed to meet specific nutritional needs and provide preventive healthcare, with an emphasis on the physiological benefits of foods in protecting against chronic diseases. Factors driving the shift toward nutraceuticals include rising healthcare costs, dissatisfaction with conventional drugs, and a preference for preventive over curative health strategies. Nutraceuticals are categorized based on their natural sources such as carbohydrates, fats, minerals, proteins, vitamins, and other nutrients like antioxidants and phytochemicals [1, 2, 3]. Candies, derived from the Arabic word "qandi" (meaning sugar), come in numerous flavors and textures, including creamy, crystalline, amorphous, and non - crystalline varieties. Basic candy ingredients include sweeteners like glucose and fructose, fats such as butter, salts, vegetable oils, and various flavorings. The manufacturing process and ingredient selection are critical in achieving the desired texture and taste in candies [4].

Chemical Constituents of Garlic



Garlic, a bulbous perennial plant, has been used both as a culinary ingredient and medicinal plant for centuries. It contains a variety of nutrients and bioactive compounds like allicin, which are responsible for its health benefits. Garlic is rich in proteins, vitamins (A, B6, B1, C), minerals (calcium, magnesium, iron, potassium, zinc), and sulfur compounds. It is known for its antioxidant, anti - cancer, antiviral, and anti - inflammatory properties. Garlic's historical significance spans cultures from the ancient Egyptians and Sumerians to Greek athletes, who consumed it for increased endurance. The World Health Organization recommends daily doses of garlic to harness its health benefits. Garlic's pharmacological effects include antioxidant activity, promoting a balance between free radicals and antioxidants in the body, thus mitigating oxidative damage [5, 6, 7]

Manuka honey, produced from the nectar of the Manuka tree (Leptospermum scoparium) in New Zealand and parts of Australia, is renowned for its antibacterial properties. This honey is rich in methylglyoxal (MGO), derived from dihydroxyacetone (DHA) during honey maturation. Manuka honey's unique attributes have heightened its global demand and vulnerability to fraud. Its color and flavor vary based on age, production, processing, and storage conditions, which also influence its physicochemical properties. Manuka honey's benefits extend beyond its antibacterial activity, making it a valued component in health and cosmetic products [8, 9]

Figure 1: View of garlic plant

Figure 2: Garlic bulbs

Manuka honey is produced by European honey bees (Apis) foraging on the mānuka (Leptospermum scoparium), 21 which evidence suggests originated in Australia.

The manuka tree flowers at the same time as Kunzea ericoides, another Myrtaceae species also called kānuka, which often shares the same growing areas. Some apiarists cannot readily differentiate these species, as both flowers have similar morphology and pollen differentiation between the two species is difficult. Manuka honey is markedly viscous. This property is due to the presence of a protein or colloid and is its main visually defining characteristic, along with its typical dark cream to dark brown colour. (13, 14)

Figure 3: Manuka Flower

Figure 4: Bowl of Manuka Honey

Evidence suggests that L. scoparium originated in Australia before the onset of the Miocene aridity, and moved as a result of long - distance dispersal events to New Zealand from eastern Australia sometime during the last 20 million years.24 Cyclones and other wind activity are most likely responsible for transporting seeds long distances.25Supporters of this claim cite evidence that the genus Leptospermum arose under conditions where frequent forest fires were common (i. e. in Australia, and not temperate New Zealand) It is now more common in New Zealand than it is in Australia. It is found throughout New Zealand.

2. Materials and Methods

Materials: Garlic extract in dried form Purchased from authenticated dealer which was AMSAR PVT. LTD.47, Laxmibai Nagar, Fort, INDORE - 452006 and Manuka honey were purchased from amazon dealer Badri's Honey. Cardamom essence was obtained from local shop from market (Lonavala).

Method:
Mixture A - Firstly Mix the water and garlic ex tract in deep bottom saucepan and allow to heat and add salt.

Mixture B - On another side, in beaker take manuka honey and distilled water, allow them to boil with constant stirring and make temperature up to 140°c (using cold water test and candy thermometer). After that add mixture A into mixture B with constant stirring with maintain temperature up to 140° and flavouring agent to the mixture.

Pour immediately into the candy Mold (sprayed with vegetable oil so that mixture does not stick with wall of candy Mold) and allowed to cooled by placing in the cooling racks. After cooling store properly at suitable temperature at cool and dry place.

Table 2: Formaulation Table of Candy

Sr No.	Ingredients	Batch 1	Batch 2	Batch 3	Batch 4	Batch 5
1	Garlic Powder	2 g	4g	6g	8g	10g
2	Manuka Honey	20g	20g	20g	20g	20g
3	Cardamom	2 drop	2 drop	2 drop	2 drop	2 drop

Evaluation Parameters:
Table: characterization of Garlic extract, Manuka Honey and candy

1) **Physical Characterization of Optimized batch of Candy**

a) Appearance: Candy was placed into watch glass and was observed for presence of foreign organic matter with naked eyes.
b) Consistency: Candy was placed into watch glass and was observed for its consistency
c) Colour: Candy was placed into watch glass and was observed for colour by visual inspection.
d) Shape: Candy was placed into watch glass and was observed for the shape by visual inspection based upon the moulds used.
e) Odour: Candy was placed into watch glass and its odour was sensed by olfactory perception.

2) Physiochemical Characteristics of Candy

- Shelf - life study: Shelf life is commonly estimated by different stability testing procedures: real - time stability tests.
- Moisture Content: About two candies were weighed in a tared evaporating dish and stored in an oven at 105°C and were weighed with regular time interval until the weight becomes constant. The following equation was used to compute the moisture content. Eq. No.1
  Eq. No.7.2
  % Moisture content = W1 – W2/W1*100

Where,
W1 = Initial weight
W2 = Final weight

- Measurement of pH: A standard single or double electrode pH meter used. Instrument shall be initially calibrated at pH 4, 6, 7 with appropriate buffer solution. The pH was measured by using digital pH meter.

3) Proximal Parameter of Candy

a) Carbohydrate

- Molisch test: A Garlic was divided into few pieces, one piece was taken, crushed and placed in a test tube. The sample was treated with α naphthol dissolved in ethanol, and then sulphuric acid was added slowly along the sides of test tube. The purple color appears the interface between test sample and acid layers.
- Fehling test: One piece of Garlic was taken, crushed and treated with equal quantity of Fehling's solutions A and B, slightly heated. The red coloured ppt. appeared.

b) Protein:
Ninhydrin Test: 1% solution of Garlic prepared in distilled water and a few drops of 2% ninhydrin solution is added to this solution. The test tube is then kept in a hot water bath for approximately 5 minutes. After a few minutes a blue or violet colour indicates the presence of amino acids, amine and protein groups.

c) Average weight: Ten candies were accurately weighed using a suitable, previously calibrated balance and their average weight was recorded. The average weight was calculated by sum up the weight of all 10 candies and divide by ten.4. Hardness testing: The hardness of a candy can be determined by Vernier calliper.

3. Result and Discussion

The formulated Candy was evaluated for their Organoleptic, Physiochemical and Phytochemical Characteristics. The organoleptic characteristics of the candy was tabulated in table 3. It is found to be brownish colour, sweet flavor and round in shape. The candy has taken 5 min for fully disintegration. As tabulated in table 5, Carbohydrate was found in high quantity in the formulated Candy.

Table 3: Characterization and Evaluation of Candy: Optimized batch

Sr. No.	Test	Standard Observation	Result
1	Color	Brownish	Brownish
2	Taste	Sweet	Sweet
3	Flavor	Sweet	Pleasant
4	Consistency	Solid	Solid
5	Shape	Round	Round

Table 4: Physicochemical Analysis of Candy

Sr. No.	Test	Result
1	Average weight	4.50 g
2	pH of candy	6.5
3	Disintegration time	5 min.

Table 5: Phytochemical Analysis of Candy

Sr. No.	Test	Result
1	Carbohydrate	88.29%
2	Protein	6.21%
3	Fat Content	0.81%
4	Energy	385.20%
5	Sodium Content	0.41%
6	Total Sugar	77.63%
7	Crude Fiber	0.05%

4. Conclusion

The Garlic Manuka Honey Candy for Nutraceutical Benefit has been formulated successfully. As a garlic extract and manuka honey gives the synergistic effect, they increase the nutraceuticals benefits of the candy. The candy was evaluated with various parameters like phytochemical analysis, pH, disintegration time, etc. It was observed that prepared Candies were having Phyto - Chemical analysis depicted presence of carbohydrates, proteins and energy in optimum range to fulfil the purpose of candy as nutraceutical.

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