Natural Products Chemistry & Research

ISSN: 2329-6836

Pande and Jude, Nat Prod Chem Res 2019, 7:1
DOI: 10.4172/2329-6836.1000355

Research Article Open Access

Comparison of Physicochemical Evaluation of Different Brands of Honey

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Received: January 12, 2019; **Accepted:** February 19, 2019; **Published:** February 27, 2019

Abstract

Marketed brands of honey in our country do not have much more standardization. Even pharmacopeia standards of honey far from complete. The present study assessed parameters to determine appropriate identification and quality of three brands honey sold in India market. For this purpose, honey of three popular brands of Indian market was selected for evaluation purpose and investigated for following parameters such as macroscopic evaluation, ash value, loss on drying, chemical tests and viscosity. In result study based on macroscopic parameters all three brands were found complies with Indian Pharmacopeia 1996. But in physical evaluation sample of brand D1 was found complies pharmacopeia standards and other two brands S1 and B1 fail in this evaluation even not about near to official minimum standards. On the basis of chemical tests evaluations, we found all three brands complies the official standards as shown in results. As per our overall observations brand D1 found good and most effective of different types of parameters of evaluations.

Keywords: Honey; Honey comb; Honey bees; *Apis melifera*; *Apis dossata*

Introduction

Uses of honey in ayurveda system of traditional medicine

Ayurveda is a local ancient system of medicine to treat native patients in the Indian Subcontinent and practiced in other parts of the world as a form of alternative medicine. In Sanskrit pioneer language of ancient India ayur means life and veda means knowledge or science. Ayurveda comprises of highest influence on peoples of South Asia throughout history. Previous literatures of Ayurvedic science appear during a Vedic period in India. Two founder scientist Charaka and Sushruta gave two treatises called as Sushruta Samhita and the Charaka Samhita popularly used as base for Ayurvedic medicinal system. Some practitioners on their own trial and error basis identified a number of medicinal preparations and surgical procedures for curing various ailments and Diseases [1].

Honey is food article produce by some insects using nectar of flowers. Honey bees are major source of various types of honey and consumed by humans. Other sources of honey appear with different properties. Honey possess rich golden colour liquid with delicious taste and alternative to white sugars.

Availability of honey is throughout year in country and consumed mostly when fresh. Regurgitation is process by which honey bees convert nector in to honey and store as food reserve in waxy honeycombs. Sweetness of honey is imparted by monosaccharide fructose and glucose same level of granulated sugar. Due to special chemical property for baking with distinctive flavor honey mostly preferred by some peoples.

But some time it may contains dormant endospores of bacterium *Clostridium botulinum*, may be dangerous to small children leading to illness and even death [2]. In Hindu tradition, babies are made to lick drops of honey and are marked by celebrations. In Hindu religion, honey enjoys the highest position along with the cow milk, when mixed together; tirth (holy/sacred nectar) is produced.

All ancient literatures clearly mention the use of honey as medicinal and health food. Honey is symbol of new year in Jewish tradition called as Rosh Hashana. Mostly apple slices are dipped in honey and eaten to celebrate New Year. Some old generation small straws of honey distributed to mark occasion.

In Islam there is an entire Surah in the Qur'an called al-Nahl (Honey Bee). The Qur'an also promotes honey as a nutritious and healthy food: "And thy Lord taught the bee to build its cells in hills, on trees and in (men's) habitations, there issues from within their bodies a drink of varying colors, wherein is healing for mankind. Verily in this is a Sign for those who give thought". Festival of Madhu purnima celebrated by Buddhist in India and Bangladesh in which honey plays important role [3,4].

Description

Colour of the honey is golden rich and with sweet taste imparts honey delicious sweetener and enjoys great advantages in food beverages. Depending on its sources honey appears in various colors such as white, amber, red, brown and almost black. Pleasant and sweet odour of honey makes product more acceptable and palatable. In all Ayurvedic formulation to impart sweet taste and good carrier it is used in Bhasma, Churna with bitter tasting nature [5].

Pharmacological profile of honey

Researchers began to document the healing properties of honey in the early part of the 20th century. Such as hygroscopic, antioxidant, wound healing, antiburn, antiallergic, immune modulator, cold and

sore throat home remedy, beauty aid, natural energy booster, insomnia, etc., by various researchers.

Types of honey

Honey is believed to be good both for body and soul; as apart from being medically accepted, the importance of honey is also recognized by many religions. A newly born baby, for example, is given honey as its first bite of food. Medically, on the other hand, honey is helpful in treating various ailments and prevents the body from many diseases.

Depending upon number of flowers from which nectar is collected divided into Mono floral honey and Poly floral honey.

Depending up on type of formation divided into Comb, Chunk, Liquid and Granulated honey. Depending up on processing techniques they group as Blended honey, Raw honey, Strained or Filtered honey, Ultra filtered honey, Pasteurized honey.

Production of honey

The entire process involves a systematic array of activities which honeybees perform. Starting from the collection of nectar, it finishes with the honey as a product. After collecting nectar from flowers, honeybees reduce the moisture through evaporation.

Then they add enzymes-change the composition. Next comes the conversion of certain complex sugars into simpler ones and conversion of sugar into gluconic acid that is required to give honey its taste. Then, after reducing the moisture to about 17%, honeybees fill the comb shells and seal them with white material called bee-wax. After collecting nectar from flowers, honeybees reduce the moisture through evaporation. Then they add enzymes-change the composition.

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Composition of honey

Chief chemical constituent of honey are simple sugars such as Glucose, Fructose and Galactose (monosaccharide) with complex sugars (oligosaccharides) such as sucrose. The major components are glucose and fructose. Due to high level of simple sugars make honey a good pre-exercise food. Just because these sugars are "pre-digested" and easily absorbed into the blood. But mostly equal in glucose/fructose concentrations when compared with sugar syrup. Although sugar syrup has same concentration of fructose and glucose levels but not easily digested as like honey in to blood stream [8].

Materials and Methods

Macroscopic evaluation

All three samples of honey were proceeding for organoleptic evaluations using procedures as per official books.

Physical evaluations: All evaluations were carried out as per procedure given below.

Ash value

Determination of total ash value: Accurately weighed (5 gm) sample of honey into a tarred porcelain crucible and place in Muffle furnace on 600°C temperature for six hours till the sample turn into grey colour. Then last two constant weights were taken and applied in formula to get total ash values [9].

Determination of acid-insoluble ash value: The total ash obtained dissolved in 25 ml of dilute hydrochloric acid washed the ash from the dish used for total ash into a 100 ml beaker. Boiled for five minutes and filtered through ash less filter paper. Residue was rinsed twice with hot water. Quantity of acid insoluble ash was determined by heating together in crucible till carbon removed. Allowed to cool in desiccator and weighed the residue to calculate acid insoluble ash value.

Determination of moisture (loss of drying): Weighed about 1.5 gm of honey in tare porcelain dish kept in the hot air oven at 100-110°C. Allowed to Cool in desiccators and kept under observation. The difference in weight was recorded as moisture content after every hour and till last two readings common.

Determination of total solids: Total solid was calculated by minus moisture content into 100 of each sample.

Total solid%=100-Moisture content.

Determination of viscosity: According to method of Akoh [10], five milliliter of each sample was carefully measured out into a Brookfield viscometer and the sample was allowed to move down the U-tube with the aid of the thumb to the other side of the viscometer. The movement was timed using a stopwatch. The viscosity was determined using Hagen Bach Poiseni equation.

Determination of pH: The pH of the honey samples were determined by carefully measuring out 10 ml of each sample into a clean beaker and its pH determined using a pH meter (Elico LI120).

Chemical evaluation: The standardization of experimental work is based on the different physicochemical parameters, with the use of different brands of honey, viz; D1, S1, B1. And hence these samples were tested and evaluated, and their profile was noted.

Determination of the hydroxymethyl furfural (HMF): As per method of Winkler (1955) 10 grams of each honey sample was dissolved in 20 ml cold water. After that transferred to 50 ml volumetric flask and make up volume to 50 ml.

In separate test tubes 2 ml of sample plus 5 ml of p-toludine solution was added. Then 1 ml of Barbaturic acid was added to each tube with 1 ml water only in blank. The absorbance of the test sample was read against the blank at 550 nm using the spectrophotometer (Shimadzhu UV1800) [11].

Evaluation of the total titrable acidity: In these method 25 ml of each sample diluted were titrated with 0.1 N NaOH solution using phenolphthalein as an indicator. The relative amount of lactic acid was determined using the mathematical formula.

Results and Discussion

Results are described from Tables 1-6.

S.No.	Features	Result		
		D1	S1	B1
1	Colour	Yellowish brown	Pale yellow	Pale yellow
2	Taste	Sweet and faintly acrid	Sweet and faintly	Sweet and faintly acrid
3	Odour	Characteristic	Characteristic	Characteristic
4	Crystallization intensity	More	Medium	Medium

Table 1: Macroscopic evaluations.

S.No.	Features	Result		
		D1	S1	B1
1	Ash value	0.60	0.74	0.84
2	Acid Insoluble Ash Value	149%	180%	295%
3	Determination of Moisture (Loss of Drying)	18%	19.40%	19.20%
4	Viscosity	4.94 Centipoise	4.13 Centipoise	4.24 Centipoise
5	Total solid content	80	79.60	79.80

Table 2: Physical evaluations.

S.No.	Tests	Result		
		D1	S1	B1
1	Molish's Test	+	+	+
2	Fehling's Test	+	+	+
3	Benedict's Test	+	+	+
4	Barfored's Test	+	+	+
5	Salwinoff's Test	+	+	+
6	Cobalt-Chloride Test	+	+	+
7	Test for Calcium	+	+	+
8	Test for Sodium	+	+	+
9	Test for Potassium	+	+	+
10	Test for Iron	+	+	+

Table 3: Chemical evaluations.

S.No.	Sample	Hydroxymethyl furfural (HMF) (mg/100 gm)
1	D1	1.21
2	S1	1.29
3	B1	1.31

Table 4: Determination of the hydroxymethyl furfural (HMF).

S.No.	Sample	pH
1	D1	4.95
2	S1	4.67
3	B1	5.06

Table 5: Determination of the pH values.

S.No.	Sample	% of lactic acid
1	D1	0.19
2	S1	0.17
3	B1	0.14

Table 6: Total titrable acidity % of lactic acid.

Conclusion

This evaluation study was intended to determine quality and physiochemical characteristics of honey collected from different suppliers. Physiochemical properties were determined using the harmonized methods of the international honey commission.

Evaluation studies based on macroscopic parameters such as colour, taste, odour and crystallization intensity of all three marketed products viz, D1, S1, and B1 honey was done. We found all samples of different brands of honey.

The results of physical evaluation we have found that evaluation values of D1 honey product is most similar to the standard values given in the Pharmacopoeia. The ash value of samples of D1, S1, B1

was determined as per the method given in Pharmacopoeia and are found to be total ash (1.64%, 2.16%, 1.95%), acid-insoluble ash (295%, 180%, 149%), moisture content (18%, 19.40% and 19.20%) and viscosity (4.94, 4.13, 4.24 centipoise) respectively. The viscosity of each of the honey samples from various samples revealed that samples from D1 had the highest viscosity of 4.94 centipoise and samples S1 had the least value 4.24 centipoise. Viscosity of the honey samples is a measure of the quality of the honey samples. Pure honey has high viscosity. A low viscosity indicates a high moisture content or dilution

With reference to different identification tests all three samples were found to confirm all tests for carbohydrates. Other tests for trace elements such as Sodium, Calcium, and Potassium were also positive but less amount presence in sample not able to find quantitatively. So, on basis of test performed all three brand samples were complies the qualitative test positively.

The results revealed that samples obtained from D1 (1.21) had low hydroxymethyl furfural. Rest two samples S1 (1.29) and B1 (1.31) with higher side of readings. Rest other two samples had little higher value indicates changes in storage conditions.

The values for pH of honey samples from various suppliers revealed that all the honey samples were acidic in nature.

Due to unhygienic handling during processing and storage conditions in local area of honey collections the result of physico-chemical studies showed variations in readings. May be adulteration was one of the reasons for some extent in India.

Hence, we had studied and evaluated three different brands of honey viz; D1, S1 and B1 honey products and evaluated them on different physicochemical parameters. As per overall observation, we found that D1 is good and most effective on the different parameters of standardization.

Acknowledgment

Authors are thankful to management of NIMS Institute of Pharmacy for providing support for research along with moral support during tenure of research project.

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