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Quality Assessment of Honey of Various Marketed Brands

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ABSTRACT

Honey possesses its taste for its monosaccharides glucose and fructose. It is studied to have antimicrobial properties, wound healing action and is also rich in antioxidants, which contribute to its anti-inflammatory and immune boosting properties. However, its composition varies based on the floral sources visited by bees. Moreover, its low water activity and pH contribute to its long shelf life and resistance to spoilage. The study focuses on the evaluation of honey from marketed products which is crucial for ensuring therapeutic efficacy and safety.

INTRODUCTION

Several honey brands are recognized for their exceptional medicinal properties, offering consumers not only a delightful sweetness but also potential health benefits.

The resistance of microorganisms to antibiotics has necessitated the unveiling of new molecules with antimicrobial properties. This increasing resistance and shrinking antibiotic pipeline indicate that a post-antibiotic era is inevitable (Appelbaum PC. 2012). Plants always being the most important moieties of discovering new therapeutics properties. Honey, a natural sweet syrupy fluid, is the nature's wonderful gift, an exudate of bee extract and nectar from flowers. It is renowned for its rich medicinal and healing properties. Unfortunately, honey is being adulterated with sweet syrupy foods blemishing the therapeutics. This research delve into therapeutic properties of various brands of honeys available in the market.

MATERIALS AND METHODS

A total of eight samples were collected from the local market, labeled and stored in appropriate storage areas till further analysis. All the samples were subjected for the phytochemical screening.

Table 1. Various brands of honey used the study

Sl.No	Brands	Label
1	Dabur honey	A
2	Lion honey	B
3	Madhu honey	C
4	Apis himalaya honey	D
5	Apollo honey	E
6	Ayurvedic honey	F
7	Natural honey	G
8	Patanjali honey	H

Determination of Phytochemical constituents

Test for Carbohydrates

Few ml of the sample, alpha naphthol in alcohol and conc. H_2SO_4 are added (Sadasivam and Manickam,2005).

Test for Monosaccharides

To the sample solution, few ml of Barfored's reagent, boiled for 1-2 minutes in boiling water bath and cool.

Test For Iron

Few ml of sample, few drops of 2% potassium ferrocyanide and5% Ammonium thiocyanate were added (Yarsen et al., 2007).

Test for adulteration (Fiehe's test)

The honey was tested for adulteration by shaking it thoroughly with 5ml of ether layer till they are miscible and later separate on standing. The upper ether layer is evaporated to dryness in porcelain dish. Add a few drops of resorcinol HCl solution in a porcelain dish. (Bogdanov, S., 2009)

Determination of total ash value

Ash value was determined by taking the sample in preweighed silica crucible, incinerated. Percentage total ash was determined (Mukherjee P.k 2006).

DETERMINATION OF MOISTURE CONTENT

Sample weighing about 1.5 g was taken in flat and thin porcelain dish dried in the oven at 100℃,until two consecutive weights do not differ by more than 0.5mg. The desiccator is cooled down and loss in weight was noted.

DETERMINATION OF SPECIFIC GRAVITY

Specific gravity of various samples was determined using density bottles.

Antimicrobial activity by TLC bioautography

Anti-microbial activity was conducted using TLC bioautography method. Gram positive and gram negative cultures used for this assay include freshly isolated cultures of *Staphylococcus aureus, Bacillus subtilis, Escherischia coli, Pseudomonas aeruginosa, Streptococcus mutans, Streptococcus gordonii, Shigella flexneri, Proteus mirabilis, Bacillus cereus.* All the organisms were procured from MTCC, Chandigarh. Briefly 1µl of bacterial suspension was added to 0.5µl of samples on the TLC sheet incubated overnight at 37 ºC. After incubation, the samples are sprayed with 2mg/ml of phenol indo 2,6 dichlorophenol and zone of inhibition was noted (Suleimana et al.,2009).

Ferrous reducing antioxidant capacity assay

Antioxidant activity of the honey samples were determined by its ability to reduce iron (III) to iron (II)) and compared to that of ascorbic acid, which is known to be a strong reducing agent. To 0.25 ml samples solutions 0.625ml of potassium buffer (0.2M) and 0.625ml of 1% potassium ferric cyanide, solution were added into the test tubes. The reaction mixtures were incubated for 20 min at 50ºc to complete the reaction. Then 0.625ml of 10% tri chloro acetic acid solution was added and centrifuged at 3000 rpm for 10 minutes. 1.8ml supernatant was withdrawn from the test tubes, mixed with 1.8ml of distilled water and 0.36ml of 0.1% ferric chloride solution. The absorbance of the solution was measured at 700nm using the calorimeter against blank (Pulido.2000).

RESULTS AND DISCUSSION

The samples were analyzed for the presence of active ingredients. The results were tabulated in the table 2. Results indicate the presence of carbohydrates and iron. Results also indicate the presence of invert sugar at varying concentrations.

Table 2. Phytochemical screening of active constituents

S.NO	**TESTS**	**RESULTS**							
Samples		**A**	**B**	**C**	**D**	E	F	G	H
1	Test for carbohydrates	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
2	Test for Monosaccharides	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
3	Barfored's test	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
4	Test for iron	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
5	Fiehe's test	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve

Test for Ash values:

Ash values are helpful to determine the quality as well as purity of honey. Table 3 indicates that sample 'H' was observed to have less ash value.

Table 3. Results of ash values

Sl.No	Samples	Ash Value(%)
1	A	0.16
2	B	0.14
3	C	0.33
4	D	0.18
5	E	0.20
6	F	0.17
7	G	0.13
8	H	0.12

Antimicrobial activity by TLC bioautography

The samples were tested for its anti-microbial activity by using following microorganisms: *Staphylococcus aurous*; *Bacillus subtilis*; *Escherichia coli*; *Pseudomonas aeruginosa*; *Streptococcus mutans*; *Streptococcus gordonii; Shigella flexneri; Proteus mirabilis; Bacillus cereus.* It was identified that sample-H has greater anti- microbial activity than other samples.

Table 4. TLC bioautography of various honey samples

Micro organisms	***Staphylococcus aureus***	***Bacillus subtilis***	***E.coli***	***Pseudomonas aeruginosa***	***Streptococcus mutans***	***Streptococcus gordonii***	***Shigella flexneri***	***Proteus mirabilis***	***Bacillus cereus***
Sample	**Zone of inhibition(cm)**								
A	1.2	1.1	1.2	1.4	1.7	1.2	1.5	1.5	1.3
B	1.4	1.4	1.5	1.5	2.1	1.6	1.8	1.5	1.5
C	0.9	0.9	1	1.2	1	1.1	1.1	1.1	0.9
D	1.3	1.2	1.6	1.2	1.4	1.6	1.5	1.25	1.1
E	1.3	1.2	1.5	1	1.2	1.3	1.4	1.1	1.2
F	1.1	1.2	1.2	1.2	1	1.1	1.5	1	1
G	1.6	1.6	1.2	1.6	1.5	2	1.9	1.5	1.8
H	1.9	1.6	1.8	1.7	1.6	1.6	1.6	1.7	1.8

Determination of Antioxidant activity: The samples were tested for its anti -oxidant activity by determining ferrous reducing antioxidant capacity and sample-H was found to have greater antioxidant activity (Table 4).

Table 5. Antioxidant values of the various samples of honey

Samples	Concentration(cm)
Sample-H	0.34
Sample-G	0.20
Sample-B	0.15
Sample-A	0.12
Sample-C	0.08

Determination of Moisture content values: Moisture content test was performed for the samples by using loss on drying method. It was found that that sample-E has more moisture content and sample-A and sample-H has less moisture content when compared to the other samples.

s.no	Samples	Percentage moisture content(%)
1	Sample-C	5.3%w/w
2	Sample-G	5.3%w/w
3	Sample-B	4.6%w/w
4	Sample-A	4%w/w
5	Sample-E	9.3%w/w
6	Sample-F	5.4%w/w
7	Sample-H	4%w/w
8	Sample-D	5.4%w/w

Determination of Specific gravity

Specific gravity test was performed for the following samples. From these we have observed that specific gravity test was found to be same for all the samples.

Sample	Specific gravity Values
Sample-A	0.03
Sample-B	0.05
Sample-C	0.03
Sample-D	0.04
Sample-E	0.04
Sample-F	0.04
Sample-G	0.03
Sample-H	0.05

Conclusion

This evaluation study was intended to determine quality and physicochemical characteristics of honey collected from different brands. The chemical test was performed by the standard procedure, and results indicates the presence of carbohydrates and iron. Ash values are helpful to determine the quality as well as purity of honey. From the results, the lowest ash value (0.12%) was determined in sample-H so it was found to be purer than other samples. Moisture content test was performed for the samples by using loss on drying method. Sample-E has more moisture content and sample-A and sample-H has less moisture content when compared to the other samples. The antimicrobial activity, Antioxidant activity was found to be maximum for sample –H than the remaining samples.

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