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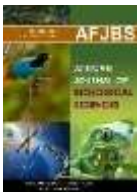

Quality Parameters In Honey: Validation Of Different Brands.

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Honey is the result of bees transforming nectar, a liquid secretion from flowers, into a supersaturated solution within their hives. Honeybees collect the nectar and, through a process involving enzymes, convert it into the sweet substance known as honey. Honey has been in use across the world since ancient times as food and medicine. As a natural product of a relatively high potency, honey has been targeted for adulteration for a long time. With the current difficulty in finding good quality of honey, the crucial role of standardization and validation is highlighted. This study collected samples honey from five local brands, subjecting them to rigorous testing for various parameters. The aim is to check a reliable quality for honey in the market. From the results have been obtained in the present study it is found that after comparing different brands of honey, Dabur honey has passed all the relevant parameters and gives more accurate results based on standard parameters. Hence, Dabur honey is best among other brands and is safe to use.

Keywords: Honey, Standardization

Introduction: -

The natural product, produced by honeybees is known as honey[1], which is made from floral nectar, has long been prized for its distinct flavour, abundance of nutrients, and several health advantages. Humans have used honey for medicinal purposes dating back over 5500 years[2]. Throughout history, a significant number of ancient civilizations such as the Mayans, Babylonians, Greeks, Chinese, Egyptians, and Romans valued honey for its medicinal and nutritional properties.[3]. Honey, the sole naturally produced substance by insects, offers benefits across various domains including commerce, cosmetics, medicine, and nutrition.[4,5]. Whether you like it or not, honey is more than just its alluring color and flavor. There is no doubt that pure honey has an abundance of health advantages, from preventing ulcers to curing cuts and coughing and many other health benefits. However, not all honey available in stores is pure[6]. Honey is frequently falsified, which implies that it is combined with sweet syrups, glucose solutions, or poor-quality honey with a lot of water[7,8]. The

growing market demand for premium honey necessitates the establishment of strict guidelines for determining and ensuring the best quality available.

The samples of five different brands were bought from the local market, and the authentication was done in the laboratory. The report will address whether the various honey brands on the market adhere to the fundamental criteria, especially those related to purity. The honey that meets all the criteria for quality or exhibits the best results among all is used in the subsequent process. This research seeks to delve into the various criteria and analytical techniques employed to evaluate the quality of honey in the market. The evaluation was done by physico-chemical analysis. the objective is to establish a robust framework for identifying and distinguishing high-quality honey.

Material and method:

Collection of Sample:

Five samples of different brands were collected from local market. The samples were kept in a cool and dry place until further analysis. At the time of analysis all the five samples were named from H1 to H5, after that samples were subjected for further analysis.

Organoleptic characteristics[9]:

Organoleptic characteristics is a primary test, all the samples were tested for color, odour, taste and smell before the physico-chemical analysis. Results for the same are listed below.

Physico-chemical parameters[10]:

Weight per milliliter

After properly cleaning and drying the pycnometer, it was calibrated by filling it with water recently boiled and cooled to 25°C, then measuring its weight. The weight of 1 ml of water at 25°C, considering air density of 0.0012 g per ml, was found to be 0.99602 g. Using this data, the pycnometer's capacity was determined. Subsequently, honey to be analyzed was set to about 20°C and poured into the pycnometer. The filled pycnometer's temperature was then adjusted to 25°C, excess substance removed, and the pycnometer weighed. The tare weight was obtained by subtracting the filled weight. Weight per milliliter was calculated by dividing the liquid's weight in grams by the pycnometer's volume in milliliters at the set temperature. This weight per milliliter should be equal or exceed 1.35, as specified in the instructions. The results are elaborated below.

Moisture content

Following the initial weighing of the honey on a pre-tared evaporating plate, approximately 10 ml was extracted. It underwent drying for 5 hours at 105°C and was reweighed. Subsequently, the drying process continued, with subsequent weighing conducted at hourly intervals until the variance between two consecutive weighing did not exceed 0.25%. Upon reaching a constant weight, the moisture content was determined by subtracting the weight differential.

Reducing sugar

For reducing sugars, 500 mg of the sample was accurately weighed and dissolved in 100 ml of double-distilled water, and volume was made up to 100 ml in a volumetric flask. Then for final calculations calibration curve was prepared by following the preparation of calibration curve for dglucose (Dextrose).

Fructose-Glucose ratio

Reagents Iodine Solution – 0.05N. NaOH solution – 0.1N. H2SO4 – concentrated. Standard Na2S2O3 – 0.05N.

Procedure –A 250 ml stoppered flask was filled with 50 ml of the honey solution. To this, 25 ml of NaOH solution and 40 ml of iodine solution were added. The solution was kept in the dark for twenty minutes. Subsequently, 5 ml of H2SO4 was added to acidify it, and the remaining iodine was promptly titrated against a standard Na2S2O3 solution. A blank reading was obtained using 50 ml of water instead of the honey solution.

Calculations-

Approximately glucose, $Per\ cent\ by\ mass\ (w) = (B - S)\ x\ 0.004502\ x\ 100/\ a$

Where B: volume of Na2S2O3 solution have required for the blank, S: volume of Na2S2O3 solution been required for the sample, a: mass of honey taken for test.

Approximate Fructose, %

By mass (x): Approximate total reducing sugars, % – w /0.925

True glucose, % by mass (y): w – 0.012 x

True fructose, Per cent by

mass (z): Approximate reducing sugars, % – y /0.925

True reducing sugars, per cent by mass: y+z

Fructose – glucose ratio = True fructose, % by mass (z)/ True glucose, % by mass (y) The final results were determined by using the above calculations.

Ash Value

Approximately 2 to 3 ml of honey were taken for analysis. The sample was then incinerated in a platinum or silica dish at temperatures of 450°C until it became carbon free. After self-cooling at temperature, the sample was weighed. The residual ash was collected on an ashless filter paper, and both were subjected to incineration at temperatures below 450°C. The percentage of ash, relative to the air-dried drug, was subsequently determined.% $ASH = ((ashed\ wt.) - (crucible\ wt.))\ x\ 100/$ $((crucible\ and\ sample\ wt.) - (crucible\ wt.))$

Acidity (expressed as formic acid)

10 grams of the sample were dissolved in 75 ml of carbon dioxide-free water in a suitable titration flask. The mixture was thoroughly mixed. Using four to six drops of phenolphthalein indicator, titration was carried out against a standard NaOH solution until the pink color persisted for ten seconds. The blank was established by using the necessary amount of NaOH solution, water, and indicator.

Calculation: $Acidity\ as\ formic\ acid\ (\%)y\ weight = 0.23\ X\ V/M$

Where V: corrected volume of 0.05N NaOH used

M: weight in gm of the sample been taken for test

Fiehe's test

Approximately 5 gm of the honey sample were mixed with 10 ml of ether in a mortar and pestle. The mixture was thoroughly combined, and the ether extract was decanted onto a porcelain plate. This extraction process was repeated twice. After allowing the extracts to dried at room temperature, a large drop of freshly prepared resorcinol solution was added. A negative reaction, characterized

by the formation of a light pink color that swiftly vanished and by colors transitioning from yellow to salmon pink, was observed.

Aniline Chloride test

5 grams of the sample were placed on a porcelain plate, to which 2.5 ml of freshly prepared aniline chloride solution was added. If commercial invert sugar is present, the reagent changes from orange-red to dark red within one minute. Shades ranging from salmon to yellow are considered insignificant.

Result and discission:

Organoleptic Characteristics:

Table 1.1. Showing the results for organoleptic characteristic of different honey brand.

S.NO.	Organoleptic Characteristics	H1	H2	H3	H4	H5
1.	Colour	Brown	Deep brown	Yellowish brown	Dark brown	Yellowish brown
2.	Odour	Sweet	Pungent	Strongly pungent	P	P
3.	Taste	A	A	A	Slightly sweet	A
4.	Smell	C	C	C	C	C

Pungent (P) Astringent (A) Characteristic (C)

Physico-chemical parameters: All the parameters were repeated for 6 times, std. deviation for all the groups is mentioned below in the table 1.2.

Table 1.2. Showing the result of Physico-chemical Parameters for honey 1

Parameter	Standard	Result/STD
Wt. per ml. at 25°	$\lessdot$ 1.35	1.46 ± 0
Moisture Content	$\gtrdot$ 25 % by wt.	18.19 ± 0.1
Reducing Sugars	$\gtrdot$ 65 % by wt.	65.11 ± 0.66
Sucrose	$\gtrdot$ 5.0 % wt.	4.35 ± 0.93
Fructose-Glucose Ratio	$\lessdot$ 1 % wt.	9.76 ± 0.76
Ash Value	$\gtrdot$ 0.50 % by wt.	0.08 ± 0.03
Acidity (Formic acid)	$\gtrdot$ 0.2 % by wt.	5.48 ± 0.28
Fiehe's Test	Negative (-ve)	Negative
Aniline-Chloride Test:	Negative (-ve)	Negative

Table 1.3. Showing the result of Physico-chemical Parameters for honey 2

Parameter	Standard	STD
Wt. per ml. at 25°	$\lessdot$ 1.35	1.41 ± 0
Moisture Content	$\gtrdot$ 25 % by wt.	16.71 ± 0.24
Reducing Sugars	$\gtrdot$ 65 % by wt.	76.52 ± 0.24
Sucrose	$\gtrdot$ 5.0 % wt.	2.51 ± 0.47
Fructose-Glucose Ratio	$\lessdot$ 1 % wt.	12.79 ± 0.89
Ash Value	$\gtrdot$ 0.50 % by wt.	0.21 ± 0.05
Acidity (Formic acid)	$\gtrdot$ 0.2 % by wt.	0.12 ± 0
Fiehe's Test	Negative (-ve)	Negative
Aniline-Chloride Test:	Negative (-ve)	Negative

Table 1.4. Showing the result of Physico-chemical Parameters for honey 3

Parameter	Standard	STD

Wt. per ml. at 25°	≮ 1.35	1.38 ± 0.01
Moisture Content	≯ 25 % by wt.	17.52 ± 0.18
Reducing Sugars	≯ 65 % by wt.	74.94 ± 0.35
Sucrose	≯ 5.0 % wt.	1.21 ± 0.24
Fructose-Glucose Ratio	≮ 1 % wt.	13.23 ± 0.14
Ash Value	≯ 0.50 % by wt.	0.04 ± 0.01
Acidity (Formic acid)	≯ 0.2 % by wt.	0.1 ± 0
Fiehe's Test	-ve	-ve
Aniline-Chloride Test:	-ve	-ve

Table 1.5. Showing the result of Physico-chemical Parameters for honey 4

Parameter	Standard	STD
Wt. per ml. at 25°	≮ 1.35	1.35 ± 0
Moisture Content	≯ 25 % by wt.	17.46 ± 0.18
Reducing Sugars	≯ 65 % by wt.	72.69 ± 0.26
Sucrose	≯ 5.0 % wt.	0.95 ± 0.3
Fructose-Glucose Ratio	≮ 1 % wt.	13.23 ± 0.38
Ash Value	≯ 0.50 % by wt.	0.23 ± 0.02
Acidity (Formic acid)	≯ 0.2 % by wt.	0.08 ± 0.01
Fiehe's Test	-ve	-ve
Aniline-Chloride Test:	-ve	-ve

Table 1.6. Showing the result of Physico-chemical Parameters for honey 5

Parameter	Standard	STD
Wt. per ml. at 25°	≮ 1.35	1.25 ± 0
Moisture Content	≯ 25 % by wt.	18.93 ± 0.71
Reducing Sugars	≯ 65 % by wt.	70.41 ± 0.26
Sucrose	≯ 5.0 % wt.	1.41 ± 0.3
Fructose-Glucose Ratio	≮ 1 % wt.	11.93 ± 0.77
Ash Value	≯ 0.50 % by wt.	0.24 ± 0.03
Acidity (Formic acid)	≯ 0.2 % by wt.	0.13 ± 0.01
Fiehe's Test	-ve	-ve
Aniline-Chloride Testre	-ve	-ve

During honey testing, it was noticed that the outcomes were consistently the same for different brands. Numerous factors were examined in the investigation, such as organoleptic characteristics, physico-chemical parameters includes wt. per ml, moisture content, sugar estimation, ash value, fructose-Glucose ratio, Acidity, etc. The test results revealed an unexpected similarity in the properties of the honey samples, in spite of the various sources and promises of unique floral varieties among the many brands.

Conclusion

Following the current analysis, it is noteworthy that the majority of the scrutinized honey brands successfully meet the established minimum standards across all parameters examined. However, it is crucial to highlight that, aligning with the predefined criteria set for this study, Dabur honey consistently surpassed the benchmarks for the maximum number of assessed parameters. This consistent excellence demonstrated by Dabur honey underscores its superior performance in meeting the specified criteria. As a result of its commendable adherence to quality standards, Dabur honey has been deemed worthy of further in-depth studies and consideration for its noteworthy

performance in this comprehensive evaluation. This decision is anchored in the pursuit of understanding the nuances that contribute to Dabur honey's exceptional quality, setting a precedent for potential advancements in the honey industry's quality benchmarks.

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