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Optimization of Functional Beverages made from Ginger Cumin and Honey

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Abstract- Ginger and honey both have an excellent nutritional and medicinal property that is why the combination of both in the right proportion makes highly nutraceutical as well refreshing drinks. Energy drinks are widely consumed by adolescents as these claim to improve performance, endurance, and alertness. Looking at the contents in the energy drinks and their benefits, the industry may like to relook at what the consumers really need. We are developing the functional drink by using ginger, Cummins, honey with the addition of water to rehydrate. The present investigation was undertaken with the objective of standardizing the process for the preparation of the functional beverage product was evaluated for proximate analysis, sensory analysis, and storage condition. Beverage contain 13% Brix, 0.20 % Acidity, these parameters remain constant at cold storage for more than 30 days. We used honey in the product instead of sugar, jaggery, or any other artificial sweetener for better consumption for diabetic patients. Increased urbanization, rising disposable income, and growing health consciousness among the youth have increased the demand for non-carbonated drinks called energy drinks.

Keywords- Ginger, Honey, Functional Beverage, Non-Carbonated, Consumer, Nonalcoholic, Energy Drink.

I. INTRODUCTION

A nonalcoholic drink that contains ingredients, including herbs, vitamins, minerals, amino acids, or added raw fruit or vegetable ingredients, which is claimed to provide specific health benefits beyond those of general nutrition.

E.g. boosting or enhancing the immune system or heart, improving joint mobility, increasing sense of well-being, increasing energy and satiety. While the market for energy drinks is expanding and is expected to grow further the drink manufacturers have a challenge of supplying drinks that consumers feel safe to consume as there has been a lot of talk about ill effects on the health of such drinks and health risks associated with them.

II. MATERIAL AND METHOD

All the raw materials for the project has taken from local market with good quality and before used of that raw material the chemical and physical quality parameter has been taken care.

1. Material:

1.1 Ginger: Garbled, non-bleached Cochin (NGC) is used in the manufacturing of Ginger powder, pieces irregular in shape and size, pale brown in color, fibrous with peel not entirely removed, light pieces removed by garbling, size of the rhizome is not less than 20 mm in length. For manufacturing of powder we used the grinder and fine powder will be taken as intermediate in the beverage.

1.2 Cumin: Cumin seed purchase from the market and cleaned. Cumin seed is used as a spice for its distinctive flavor and aroma Cumin Powder or ground cumin (also known as Jeera Powder) is made by powdering dry roasted cumin seeds in a grinder. This homemade powder might appear ordinary but it has the magical powers to completely change the taste of a drink.

1.3 Honey: We have used local market honey from Dabur Brand. Ayurveda has shown lots of medicinal use of Honey. In fresh honeys, there's practically no hydroxymethylfurfural (HMF), it increases upon storage period, counting on the pH of honey and on the storage temperature.

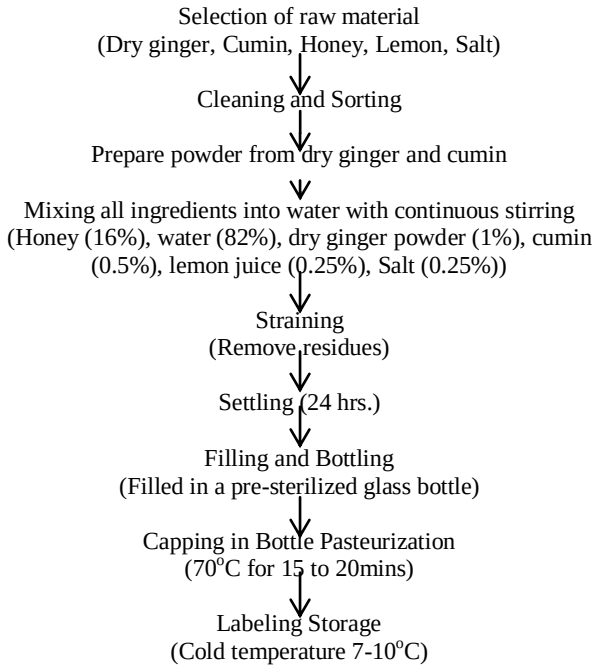
1.4 Lemon Juice: Lemon juice has had purported health benefits for hundreds of years. Lemon was bought from the market and get juice by hand squeezer also done physiochemical characteristics of juice.

1.5 Salt: Common salt was used in the beverage from market.

1.6 Water: The RO water was used from the Department of Technology, Shivaji University. Water with TDS (Total Dissolved Solids) more than 500 mg/L.

2. Equipment used:

Most of the equipment used in the project is available in pilot plant of our institute Department of Technology, Shivaji University.



(Reference: Vinita Puranik, D. K. Chauhan and Vandana Mishra, International Journal of Biotechnology Research Vol.1 (3), April 2013, Pg. 30).

3. Method Physiochemical Analysis:

3.1 Moisture Content: Moisture content was determined by using hot air oven drying method. 5 gm. of sample of each Material (M) was taken in pre-weighed empty petri plate and dried in hot air oven at 105 0C till constant weigh were obtained (6-7 hrs.). Plates were cooled in desiccators. The moisture content was calculated by using formula. (Ranganna, 1986).

$$\% \text{ Moisture} = \frac{\text{M Initial} - \text{MDried}}{\text{M Initial}} \times 100$$

3.2 Ash Content: Ash content was done by the use of muffle furnace. 2 gm of dried sample was ignited is muffle furnace for 4 -6 hrs. at 550 0C. Total ash was expressed as percentage. The ash was calculated using following formula. (Ranganna, 1986)

$$\% \text{ Ash} = \frac{\text{M Ash}}{\text{MDried}} \times 100$$

3.3 Protein Content: The determination of protein content was carried out by Kjeldhal's method using 5 gm. sample. The Kjeldhal methods based on wet combustion of the sample by heating with concentrated sulphuric acid in the presence of metallic catalysts to effect the reduction of organic nitrogen in the sample to ammonia which retained in solution as ammonium sulphate. Then digested sample was distilled with NaOH and titrated with 0.1N HCL. The percentage of nitrogen of was calculates by using following formula. (Ranganna, 1986)

% of Protein = % of Nitrogen×6.25

3.4 Crude Fat Content: Fat content was estimated by using Soxhlet method sample used were extracted by using petroleum ether (Boiling point 60 -800C) Extraction was continued till the completion of 6 cycles. Then ether was evaporated and round bottom flask was cooled by keeping in desiccators. After cooling weight of round bottom flask was taken and percentage of crude fat was calculated by using following formula. (Ranganna S. 1986).

3.5 Total Soluble Solids: The total soluble solids (TSS) were estimated with the help of Erma hand refractometer; care was taken that the prism of the refractometer was washed with distilled water and wiped dry before use (Ranganna, 1986).

3.6 Titratable Acidity: The titratable acidity was determined by taking 10ml of sample with addition of 5ml distilled water and titrated against standard 0.1N NaOH solution using phenolphthalein as an indicator. The acidity was expressed in terms of Lactic acid present using the formula. (Ranganna, 1986).

4. Microbial Study:

4.1 Total plate count of beverage – The total plate counts of beverages were carried as per standard procedure (USDA).

- **Preparation of food homogenate –**Make 1:10 dilution of the well-mixed sample, by aseptically transferring the sample to the desired volume of diluents. Weigh 1 gm of sample into a sterile blender jar. Add 9 ml of diluent. Blend for 2 min at low speed (approximately 800rpm).
- **Dilution –** Pipette 1 ml of food homogenate into a tube containing 9 ml of diluent. From the first dilution transfer 1 ml to the second dilution tube containing 9 ml of diluent. Repeat using a third, fourth or more tubes until the desired dilution is obtained.
- We have used Nutrient Agar with pour plate count method for total plate count. Following incubation count all colonies on dishes containing 30-300 colonies and record the results per dilution counted. Multiply the observed colonies by the dilution factor and record the results with the following formula.

Number of Colonies ×Dilution Factor =Cfu/ml

4.2 Yeast and Mold Count: Both yeasts and molds cause various degrees of deterioration and decomposition of foods. So, it's important to calculate the growth rate of yeasts and molds.Apparatus used for is laminar air flow, media, sterile Petri plate, incubator (37°C). Media used Potato dextrose agar and Incubation temperature is 37^0 C/ 2 day. Pour the PDA media into these petri dishes. The plates were swipe gently in clockwise and anticlockwise directions and allowed the agar to solidify at room temperature. The plates

were incubated in bacteriological incubator at 37^0 C for 2 days. Colony counted using colony counter and noted down for further calculation.

Number of Colonies ×Dilution Factor =Cfu/ml of 1ml

(Reference: U. S. Food and Drug Administration, Bacteriological Analytical Manual, Chapter 1 and 3, 2001).

III. RESULT AND DISCUSSION

The present investigation was undertaken with an objective of standardizing the process for preparation of the functional beverage product was evaluated for proximate analysis, sensory analysis and storage and the results obtained from these studies are presented and discussed as below.

Table 1. Chemical analysis of raw Ginger.

Sr. No.	Parameter	Percentage
1	Priotein	20.85
2	Essential Oil	38.2
3	Moisture	4.64
4	Ash	4.37
5	Crude Fiber	7.94
6	Carbohydrate	31.94

Table 2. Chemical analysis of Cumin.

Sr. No.	Parameter	Percentage
1	Moisture	6.9
2	Ash	5.7
3	Protein	6.6
4	Fat	1.8
5	Crude Fiber	5.1
6	Carbohydrate	66.5

Table 3. Chemical Analysis of Water.

Sr. No.	Parameter	Percentage
1	pH	7.71
2	Alkalinity (mg/ml)	40
3	Free CO2 (mg/ml)	8
4	Hardness	40
5	Turbidity (NUT)	0.16
6	Odour	No Off Taste
7	Taste	No Off Taste

It was noticed from table no. 3 all the parameters of Water comply with the Indian Standard for Drinking Water Specification IS 10500: 1991.

The range of pH is 6.5 – 8.5, alkalinity 200-600 mg/lit, Free CO2 less than 10 ppm, hardness 300-600 mg/lit, turbidity less than 0.5 NTU. Table values are in accordance to Indian Standard for Drinking Water Specification.

Table 4. Chemical analysis of Honey.

Sr. No.	Parameter	Percentage
1	Fructose	38.2
2	Glucose	31
3	Maltose	7.2
4	Carbohydrate	4.2
5	Sucrose	1.5
6	Minerals & Vitamins	0.5
7	Water	17.1

IV. OPTIMIZATION OF PROCESS

The main goal of the process was optimization is to reduce or eliminate time and resource wastage, unnecessary costs, bottlenecks, and mistakes while achieving the process objective.

Here we have a set of few different compositions with Honey and Dry Ginger to optimize the sweetness and the pungent aroma. So it will help to develop sharp flavor to final beverage and increase the acceptance level of beverage also it will helpful for cost reduction.

Table 5. Optimization of Ready to Serve Beverage at various Honeys.

Sample	% Honey concentration	Colour	Flavour	Taste	Over all Acceptability
A	10	7.4	7.6	8	7.9
B	12.5	7.6	7.3	8.2	7.6
C	16	8	8.3	8.5	8
D	17.5	8.9	8.8	8.6	8.6
E	20	7.5	8.2	8.2	8.1

Table 6. Optimization of Ready to Serve Beverage at various Ginger.

Sample	% Dry Ginger concentration	Colour	Flavour	Taste	Over all Accept ability
A	1	7.6	7.4	7	7.6
B	2	8.6	8.8	9	8.8
C	3	8	7.4	7.8	7.7
D	4	8.1	7.1	7.2	7.4
E	5	7.9	6.9	7	7.3

Table 7. Final Ration for Beverage.

Sr. No.	Ingredient	Quantity (%)
1	Water	82
2	Honey	16
3	Dry Ginger Powder	1
4	Cumin Powder	0.5
5	Salt	0.25
6	Lemon	0.25

On the basis of above study we have finalize the formulation of final beverage and investigate the most acceptable beverage.

Table 8. Physical analysis of Functional Beverage.

Sr. No.	Parameter	Result
1	Colour	Golden Yellow
2	Appearance	Clear
3	Taste	Sweet Sparkling
4	Flavour	Pleasant

Brix/acid ratio was found to be the best objective measurement that reflected the consumer acceptability. We have got Brix acid ration is 70 which is most acceptable for beverages

Table 9. Chemical analysis of Functional Beverage.

Sr. No.	Parameter	Percentage (%)
1	Acidity	0.20
2	TSS	14

Sensory evaluation was carried out by a panel of ten semi trained panel members. Hedonic rating test was employed using 9point hedonic scale. Same technique has been used for all samples in the work. The results are shown in table no.10.

Table 10. Sensory Evaluation chart of Functional Beverage.

Sample	Appearance	Colour	Taste	Over all Acceptability
A	7.9	8.1	8.2	8
B	7.5	7.2	7.9	7.5
C	8.2	8.3	8.8	8.6

According to table no. 10 sample C got highest rating in the appearance, colour, and taste than sample A and B. As well as average overall acceptability of sample 8.6 is more than other sample. So we have selected sample C as our final product.

V. STORAGE STUDY

The stability and shelf-life of a food product are critical to its success in the marketplace, yet producers experience considerable difficulties in defining and understanding the factors that influence stability over the desired storage period.

To evaluate the shelf life we have done the storage study for beverages. We kept the sample at room temperature (28-32℃) and refrigerator temperature (7-10℃) for 30 days. The results are shown in table-11and 12.

Table 11. Effect of storage on chemical parameters of functional Beverage at Room Temperature and Refrigerator Temperature.

Storage Periods	Room Temperature (28-32℃)		Refrigerator Temperature (7-10℃)	
	Acidity (%)	TSS (%)	Acidity (%)	TSS (%)
0	0.20	13	0.20	13
7	0.20	13	0.20	13
15	0.18	13	0.20	13
30	0.15	13	0.20	13

We studied the effect of storage condition of functional beverage with respect to sensory parameters like color, mouth feel, Flavor, Taste etc. The Functional Beverage has acceptable characteristics during the period of 30 days at both room temperature and cold temperature.

Table 12. Effect of storage on Sensory of functional beverage in a Glass bottle.

Storage Periods (Days)	Sensory Parameter				Remark
	Colour	Mouth Feel	Flavour	Taste	
0	Good	Good	Pleasant	Good	Acceptable
7	Good	Good	Pleasant	Good	Acceptable
15	Good	Good	Pleasant	Good	Acceptable
30	Good	Good	Pleasant	Good	Acceptable

Overall performance of beverage is up to mark and the life of beverage is good in a glass bottle for 30 days. There is lots of scope for improving the taste, colour and flavor

with other flavouring, colouring, natural and artificial sweetening agents. Also, we can make further extended study for the same beverage for different packaging materials and their shelf life as well the changes in physiochemical and microbiological study.

With the help of such a project, we can help society by adopting an integrated approach to addressing both personal and population economical needs by establishing a stronger food quality improvement support system to assist rural health systems and professionals. Enhancing the human resource capacity of food processing professionals in rural communities and expanding the preparedness of rural residents to actively engage in improving their health and economic conditions.

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