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### Utilization of Rose petals and Hibiscus petals for the development of value-added Toffee and Herbal tea

**Singh Suryansh, Gupta Alka and Verma Tripti**

#### Abstract

The present investigation was aimed to development of value added Toffee and Herbal tea with utilization of different proportions of Rose petals extracts, Hibiscus petals extracts, Guava pulp, Cardamom powder, Cinnamon powder and Lemon juice. The different formulation were carried out using Rose petals extracts, Hibiscus petals extracts, Guava pulp and Lemon juice in preparation of value added Toffee. For Herbal tea also different formulation were carried out using Rose petals extracts, Hibiscus petals extracts, Cardamom powder, Cinnamon powder and Lemon juice in preparation of Herbal tea. Prepared value added Toffee and Herbal Tea then evaluated for sensory properties with respect to colour and appearance, body and texture, taste and flavor, and overall acceptability using 9-point hedonic scale. The results revealed that value added Toffee and Herbal tea prepared with utilization of Rose petals extracts, Hibiscus petals extracts, Guava pulp, Cardamom powder, Cinnamon powder and Lemon juice both treatment (T<sub>2</sub>) secured highest score (i.e. 8.8 and 8.6) was superior as compared to rest of samples. It was found that value added Toffee and Herbal tea prepared with Rose petals extracts, Hibiscus petals extracts, Cardamom powder, Cinnamon powder and Lemon juice was rich source of micronutrients including calcium, iron, phosphorus. The cost of the raw ingredients for preparing value added Toffee per 100 g were Rs.5.70 for T<sub>0</sub>, Rs.9.20 for T<sub>1</sub>, Rs.11.50 for T<sub>2</sub> and Rs.13.70 for T<sub>3</sub> and cost of Herbal tea per 100 ml were Rs.3.50 for T<sub>0</sub>, Rs.9.0 for T<sub>1</sub>, Rs.11.50 for T<sub>2</sub> and Rs.13.50 for T<sub>3</sub>. Thus, it can be concluded that utilization of Rose petals extracts, Hibiscus petals extracts, and Cinnamon and Lemon juice beneficial for growing children and adolescents due to the essential nutrients contents like iron, calcium and phosphorus.

**Keywords:** Value-added food products, rose petals, hibiscus petals, sensory, nutritional composition, cost calculation

#### Introduction

Edible flowers are used in food processing to improve the appearance, flavor, and nutritional content of many foods and beverages. They also provide distinct textures and colors, making them popular in gourmet and artisanal food products. According to (Verma and Gupta, 2020)<sup>[14]</sup> People are becoming more aware of their health and diet. Customers want convenient, tasty, affordable, and nutritious foods.

Flowers were used medicinally and nutritionally by the Greeks, Romans, and Chinese in ancient times. Some ailments, notably those involving open wounds, were treated with the fresh flowers. Aromatherapy commonly employs rose, lavender, rosemary, and passionflower. Edible fresh flowers were often thought of and transported as exquisite seasonings.

A growing number of people are using edible flowers as garnishes or ingredients in salads, soups, dinners, desserts, and drinks. Studies and evaluations show that edible flowers have substantial nutritional benefits.

Roses are a good source of dietary phytochemicals like carotenoids, phenolic acids, and flavonoids (anthocyanins, flavonols, and flavonols). As a result of the presence of these phytochemicals, rose acts as an antioxidant, anti-inflammatory, anti-cancer, anti-aging, anti-microbial, hepatoprotective, and neurogenic agent (Gupta *et al.*, 2022)<sup>[6]</sup>.

The majority of rose-flavoured products currently on the market, such as *Roselassi* (sour milk), *rose ice cream*, *rose syrup*, and *desserts* are made using rose petals, artificial colors and flavours. These artificial hues and tastes can occasionally be allergies and cancer-causing.

Due to this, natural sources with high anthocyanin contents are becoming more and more popular in the food and medical industries for the production of dietary supplements with therapeutic and nutritional purposes (Aggarwal and Kaur, 2017) [1].

Fresh or dried hibiscus flower calyxes are frequently utilized in non-medical purposes, particularly for food applications, to make hot or cold beverages, tea, jellies, jams, sauces, wines, syrups, ice cream, and chutneys. Additionally, calyxes enhance the flavour and colour of herbal teas and baked goods. They can also be roasted and used as a coffee replacement. Regarding the medical applications of hibiscus flower, many people around the world employ herbal remedies to cure a variety of ailments. hibiscus flower leaves and calyxes have been used as a decoction, infusion, or maceration as an antimicrobial, antiparasitic, antioxidant, laxative, antispasmodic, diuretic, hepatoprotective, antianemic, anti-inflammatory, analgesic, antitussive, choleric, antipyretic, hypotensive, cardio protective, and neuroprotective agent in this context. The treatment of intoxication is another use for it. Although commercially produced in some nations, the majority of hibiscus flower preparations are manufactured at home.

Toffee is an important sugar confectionery product. Pulpy fruits such as mango, guava, papaya, fig, and jackfruit can be used to make toffee. Fruits are sapid and can be utilized fresh, as value-added products, or processed. These are economically significant and nutritionally important items. People has included these goods in his diet to provide variety, taste, mystery, fashionable intrigue, and to meet certain nutritional requirements. Toffees manufactured from fruits are typically particularly nutritious since they include a high concentration of the natural substance from which they are made (Kohinkar *et al.*, 2014) [8]. According to (Verma and Gupta, 2020) [14] Dark chocolate includes a high concentration of flavonoids, an antioxidant. Research indicates that it improves concentration, memory, mood, and combats cognitive decline in older persons. Remember to enjoy chocolate in moderation.

Herbal tea is an infusion, a popular beverage made from the leaves, flowers, seeds, fruits, stems, or roots of plant species other than *Camellia sinensis* L that has been used for health care and illness prevention. Herbal tea offers a variety of therapeutic effects, including antioxidant, anti-inflammatory, antimicrobial, anticarcinogenic, cardioprotective, hepatoprotective, and neuroprotective properties, and can be used to promote human health and lower the risk of chronic diseases. Herbal tea, a value-added beverage, can be made from commercial flowers such as rose, chrysanthemum, marigold, jasmine, hibiscus, and many more. Tea has high levels of polyphenolic flavonoids, which have antioxidant properties.

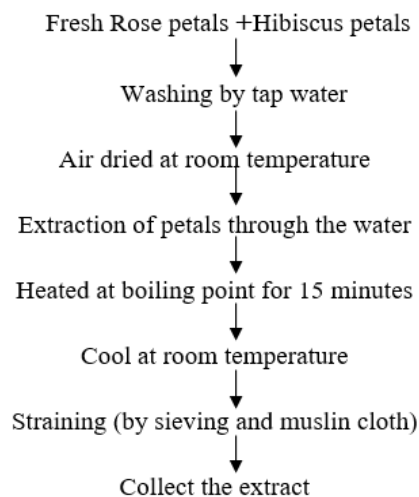
## Materials and Methods

- 1. Experimental Site:** The Nutrition Research Laboratory of the Department of Foods, Nutrition, and Public Health at the Ethelind College of Community Science, Sam Higginbottom University of Agriculture, Technology, and Sciences, Prayagraj, Uttar Pradesh, fresh rose and hibiscus petals were utilized for the creation of value-added food products.
- 2. Procurements of Raw Materials:** The components and raw materials, which included Hibiscus, Rose petals, Cinnamon and Cardamom were purchased at the Prayagraj district's local market in Uttar Pradesh.

- 3. Development of Value Added Food Products:** In order to produce the value-added food items Toffee and Herbal tea, raw materials such as rose and hibiscus petals were included. There was a baseline formula (control T<sub>0</sub>) for each products, and there were three variations (T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub>) where one or more ingredient amounts were changed.

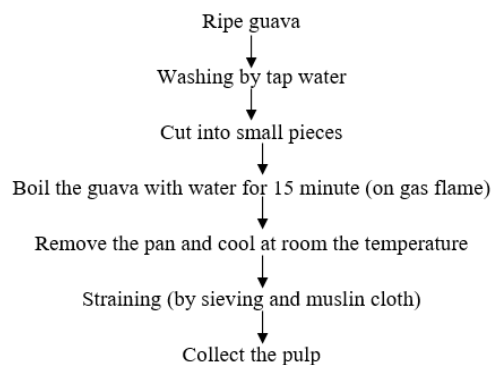
## Preparation of value added Toffee by using Rose petals extracts, Hibiscus petals extracts and Guava pulp

### Extraction of Rose petals and Hibiscus petals

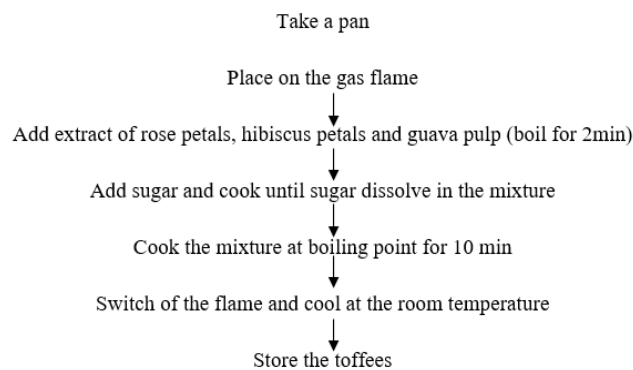


**Fig 1:** Flow chart showing the extraction of rose petals and hibiscus petals

### Preparation of guava pulp

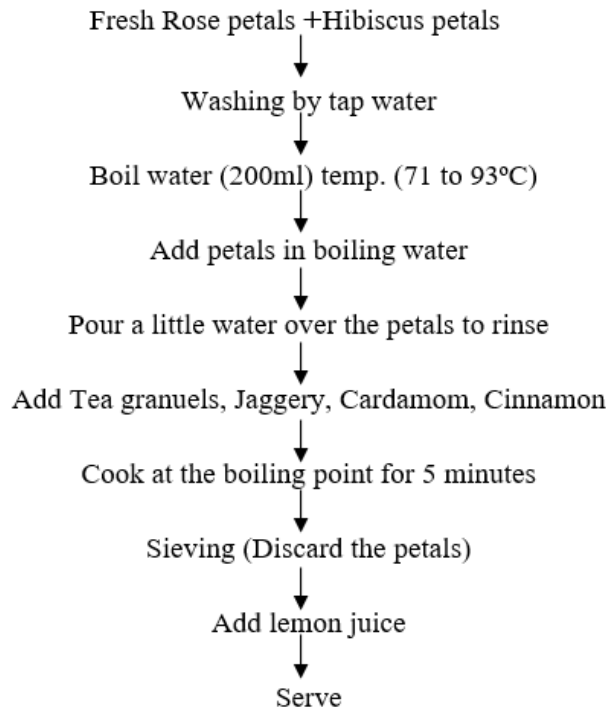


**Fig 2:** Flow chart showing the preparation of Guava pulp



**Source:** Nurdin *et al.*, (2022)

**Fig 3:** Flow chart showing the preparation of Toffee by using Rose petals extracts, Hibiscus petals extracts and Guava pulp



Source: Pawar *et al.*, (2017) <sup>[9]</sup>

**Fig 4:** Flow chart showing the preparation of herbal tea by using Rose petals extracts, Hibiscus petals extracts, Cinnamon and Cardamom powder.

**Table 1:** Treatments for preparation of toffee per 100gm with incorporation of rose petals extracts, hibiscus petals extracts, guava pulp, lemon juice and sugar

Treatments	Guava Pulp (g)	Rose petals extracts (ml)	Hibiscus petals extracts (ml)	Sugar (g)	Lemon juice (ml)	Replications
T <sub>0</sub>	65	-	-	30	5	3
T <sub>1</sub>	50	10	5	30	5	3
T <sub>2</sub>	40	15	10	30	5	3
T <sub>3</sub>	30	20	15	30	5	3

**Table 2:** Treatments for Preparation of herbal tea (/100ml) with incorporation of Rose petals extracts, Hibiscus petals extracts, Jaggery, Lemon juice, Cardamom and Cinnamon

Treatments	Rose petals extracts (ml)	Hibiscus petals extracts (ml)	Jaggery (%)	Tea granules/ Tata tea (%)	Lemon juice (ml)	Cardamom powder (%)	Cinnamon powder (%)	Replications
T <sub>0</sub>	-	-	5	5	5	1	1	3
T <sub>1</sub>	10	10	5	5	5	1	1	3
T <sub>2</sub>	15	15	5	5	5	1	1	3
T <sub>3</sub>	20	20	5	5	5	1	1	3



**Plate 1:** Showing the control and treatment of value added toffee



Plate 2: Showing the control and treatment of value added herbal tea

**Developed value-added food products**

4. **Sensory evaluation of the developed Food Products:** Sensory evaluation of the food products for their acceptability was done by a panel of 5 judges. The score

card based on the 9-point Hedonic Scale was used for sensory evaluation (B. Srilakshmi, 2023) [11].

5. **Determination of Nutritional Composition of the Developed Value-Added Food Products:** The Nutritive Value of Indian Foods book, published by NIN, ICMR (2018), was used to determine the nutritional composition of the value-added food products that contained Rose and hibiscus Petals.
6. **Cost Calculation:** The cost of each individual raw material used to create the food products at the going rate in the market was taken into account when calculating the cost of the finished goods.
7. **Statistical Analysis:** The data was statistically analyzed by using appropriate statistical analysis of variance (ANOVA) and critical difference technique. A significant difference between the treatments was determined by using CD (Critical Difference) test. “t” test was performed for comparing the difference in nutritional content between the control and the best treatment of the nutritionally enriched food products.

**Results and Discussion**

**Graphic representation of Average Sensory score of different attributes of Toffee**

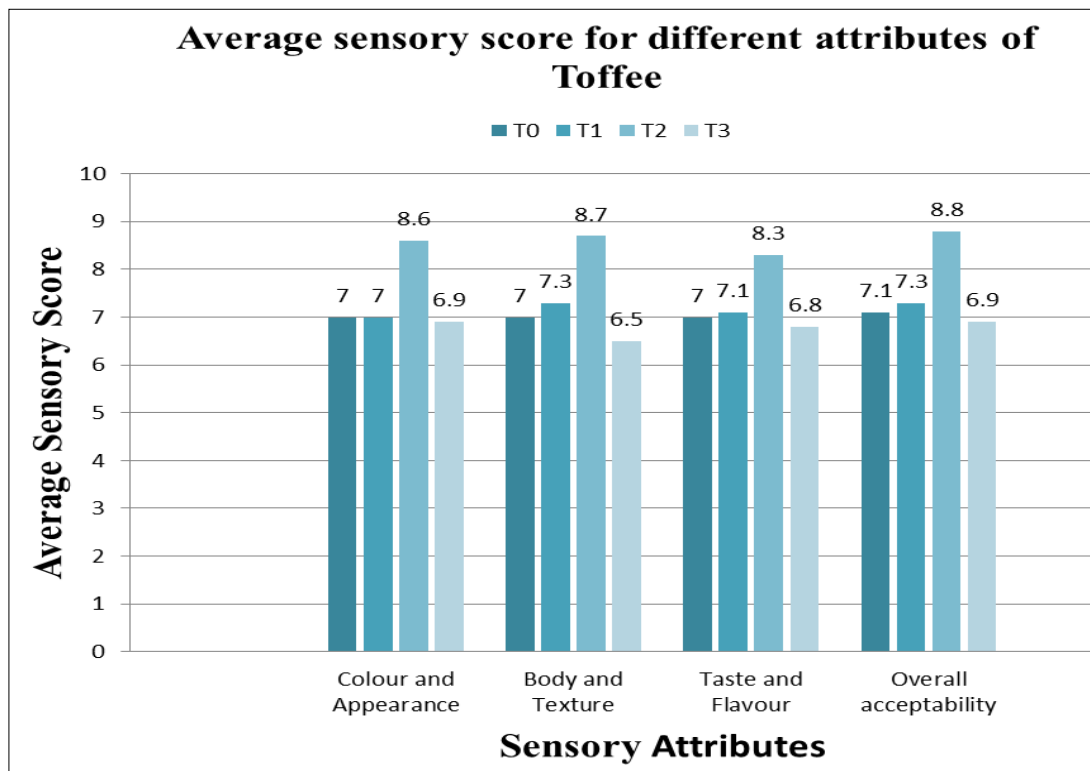


Fig 2: Average Sensory score of different attributes of value added Toffee

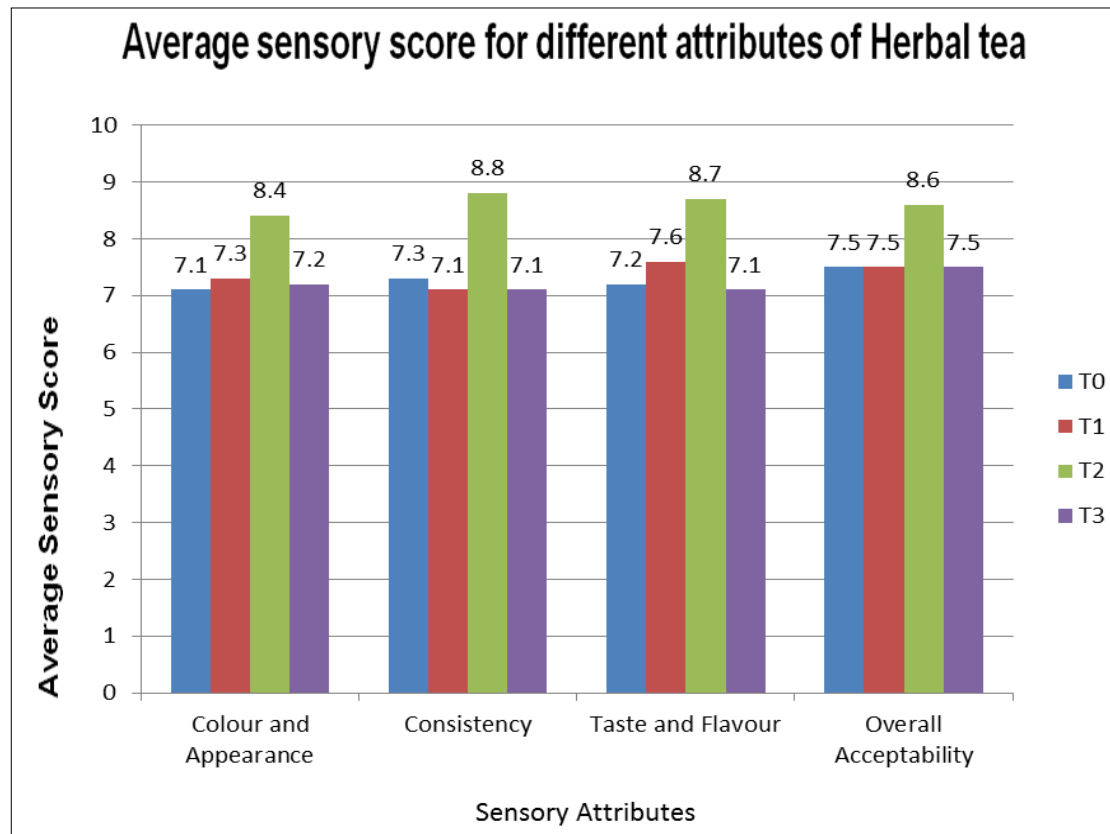
Results of sensory evaluation of value added Toffee prepared with Rose petals extracts, Hibiscus extracts, Guava pulp and Lemon juice presented in revealed that the overall acceptability of value added Toffee ranged from 8-7. This indicated that the recipes were found under the category of "liked moderately to like very much. Standard value added Toffee exhibit highest scores for all sensory attributes i.e. 8.6, (colour & appearance), 8.7, (texture), 8.3,(taste & flavor) and 8.8, (overall acceptability) as compared to value added Toffee prepared with Rose petals extracts, Hibiscus petals extracts, Guava pulp and Lemon juice. However, utilization of Rose petals, Hibiscus petals, Guava pulp and Lemon juice in value added Toffee up to 100 per cent level maintains like very

much like on the basis of 9-point hedonic scale. Statistical data revealed that there was significant difference in mean rank in terms of taste at ( $p \leq 0.05$ ) and overall acceptability at ( $p \leq 0.01$ ) significant difference was observed in terms of colour and appearance, body and texture and taste and flavour and overall acceptability. It was observed that all experimental treatments of Toffee showed increased intensity of colour because of the incorporation of Rose petals extracts and Hibiscus Petals extracts in Toffee. The result was supported by the findings of (Kumar *et al.*, 2018) [7] showed that the colour grading value of mixed fruit toffee gradually decreased from 0 to 120 days of storage, with modest variances seen across all treatments. Storage of mixed fruit

toffee may cause colour loss owing to browning. Toffee browning could be due to enzymatic oxidation of polyphenols or non-enzymatic oxidation of vitamin C. (Pandey *et al.*, 2018) [7] showed that the C2S3 treatment combination (60 percent mango and 40 percent papaya pulp with 400 grams of sugar) produced the finest mixed fruit toffee results in terms of flavour, though, and it outperformed the others by a considerable margin. Mixture fruit toffee was found to have significantly lost flavour with storage. This occurs because certain enzymatic, physiological, or biochemical alterations lead to the formation of an off-flavour in the product, which has a negative impact on its taste. (Rangare *et al.*, 2018) [7]

reported that C2S3 had the highest texture value (60% mango + 40% papaya with 400 g sugar), whereas C4S1 had the lowest (20% mango + 80% papaya with 200 g sugar). According to the findings, adding more mango pulp to mixed fruit toffee was found to improve its texture more effectively than adding papaya pulp. In addition, the toffee's texture improved with the addition of 400 g of sugar. A very minor change in the texture of mixed fruit toffee was noted as the storage period increased.

**Graphic representation of average sensory score of different attributes of per 100 ml of Herbal tea**

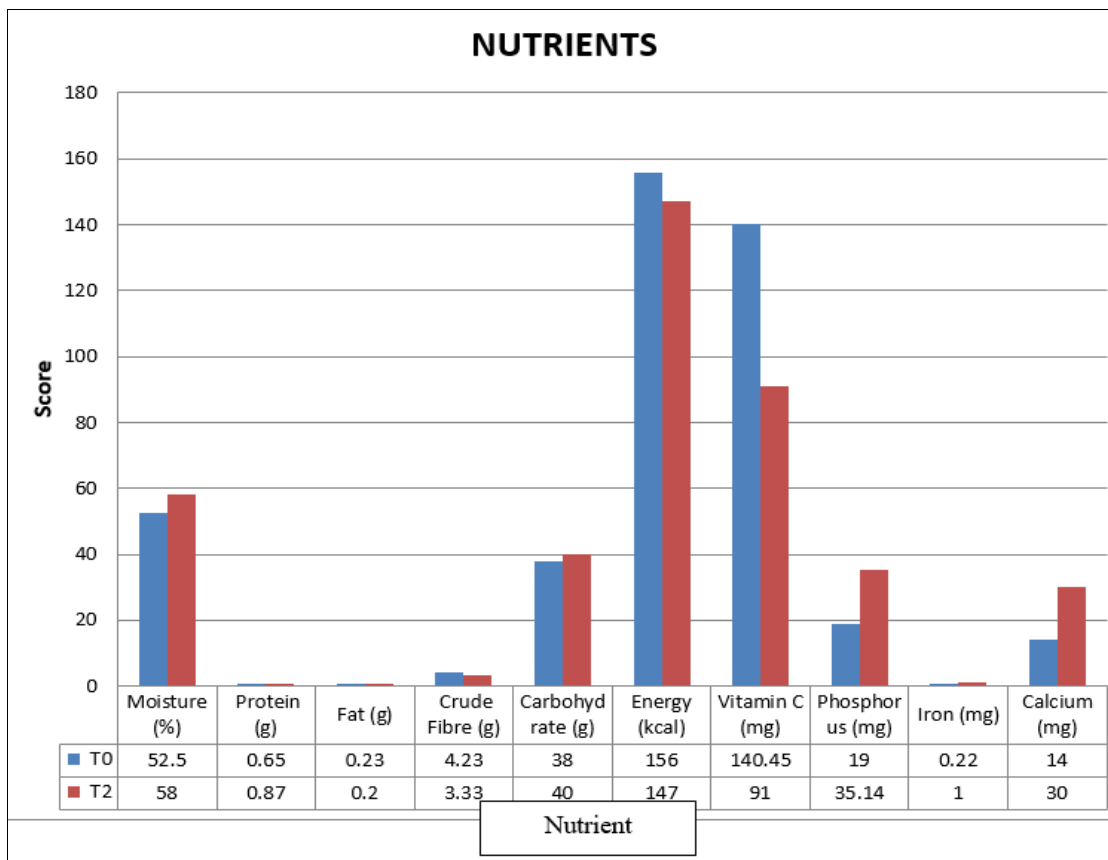


**Fig 3:** Average Sensory score of different attributes of Herbal tea

Results of sensory evaluation of value added Herbal tea prepared with Rose petals extracts, Hibiscus extracts, Cinnamon powder, Cardamom powder and Lemon juice presented in revealed that the overall acceptability of value added Herbal tea ranged from 8-7. This indicated that the recipes were found under the category of "liked moderately to liked very much. Standard value added Herbal tea exhibit highest scores for all sensory attributes i.e. 8.4, (colour & appearance), 8.8, (consistency), 8.7, (taste & flavor) and 8.6, (overall acceptability) as compared to value added Herbal tea prepared with Rose petals extracts, Hibiscus petals extracts, Cinnamon powder, Cardamom powder and Lemon juice. However, utilization of Rose petals, Hibiscus petals, and Cinnamon, Cardamom and Lemon juice in value added Herbal tea upto 100 per cent level maintains like very much like on the basis of 9-point hedonic scale. Statistical data revealed that there was significant difference in mean rank in terms of taste at ( $p < 0.05$ ) and overall acceptability at ( $p < 0.01$ ) significant difference was observed in terms of

colour and appearance, consistency and taste & flavour and overall acceptability. It was observed that all experimental treatments of Herbal tea showed increased intensity of colour because of the incorporation of Rose petals extracts and Hibiscus Petals extracts in Herbal tea. The result was supported by the findings of (Babu *et al.*, 2024) [12] stated that there were substantial variations across treatments in terms of general acceptability of prepared herbal tea. T<sub>2</sub> (Dried rose petals and dried lemon grass in 1:1) had the highest overall acceptability score (8.60), followed by T<sub>4</sub> (Dried rose petals and dried tulasi leaves in 1:1) (8.00), and T<sub>1</sub> (Dried rose petals-Control) had the lowest (6.00). (Kumar *et al.*, 2024) [12] showed that the taste of herbal tea prepared using various treatment combinations differed significantly. T<sub>2</sub> (Dried rose petals and dried lemon grass in 1:1) had the highest score of all the treatments (8.50), followed by T<sub>4</sub> (Dried rose petals and dried tulasi leaves in 1:1) (7.75). The lowest score (6.00) was obtained in T<sub>1</sub> (Dried rose petals-Control).

**Graphic representation of Nutrients score of different attributes of per 100 g of value added Toffee**



**Fig 4:** Nutrients score of different attributes of value added Toffee

**Nutritional evaluation of prepared product value-added Toffee**

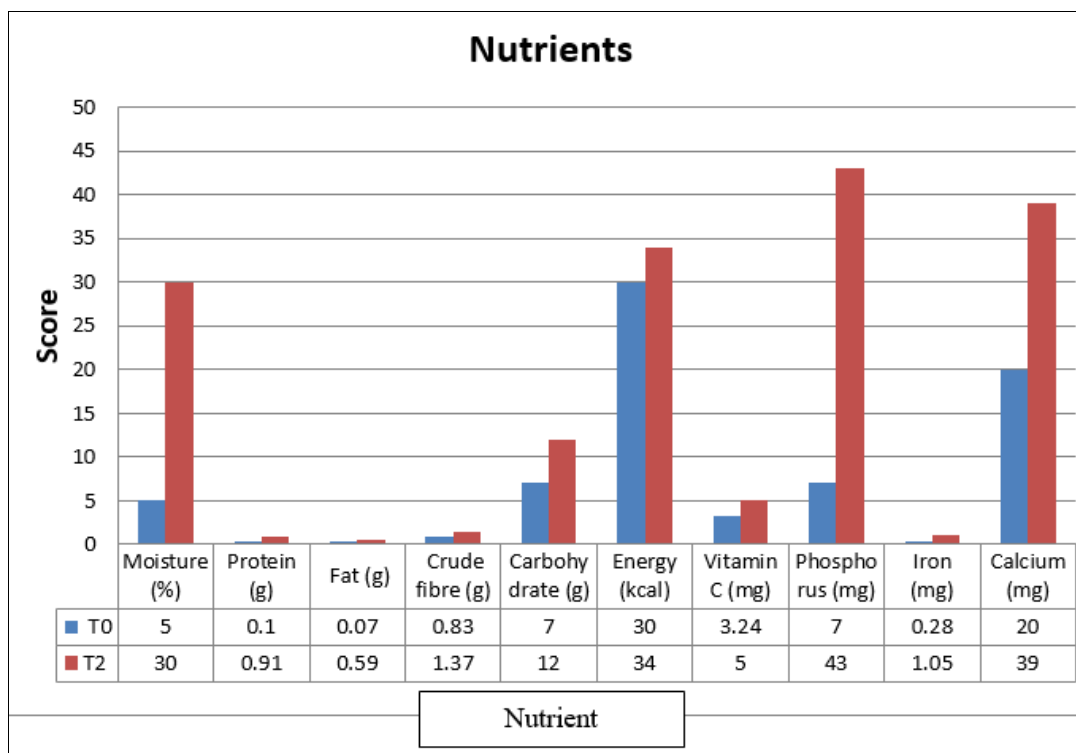
Value added Toffee is determined their nutrient content from nutritive value of Indian food book published from NIN by ICMR (Gopalan *et al.*, 2023) [3]. The above Fig 4 shows the “t” value of control and best treatment for value added Toffee. The Fig 4 indicates a significant difference between the nutrient content of the control (T<sub>0</sub>) and the best treatment (T<sub>2</sub>) as the calculated value of “t” which was found to be for calcium content 30mg, phosphorus content 35.14mg and iron content 1mg was higher than the tabulated value of “t” which is 4.303 at 5 percent probability level. It is quite obvious from the above Figure 4 that because of utilization of Rose petals, Hibiscus petals and Guava pulp an in different ratios resulted in improved nutritional content in value added Toffee. According to (Dighe *et al.*, 2022) [5] mentioned that Guava fruit has high levels of vitamin C, as well as other minerals like vitamin A, phosphorus, iron, and calcium. It also contained polyphenol, flavonoids, saponin, etc. The nutritional value of this food includes protein (0.1-0.5g), fat (0.43-0.7g), carbohydrates (9.1-17g), crude fiber (0.9-1g), and calories (77-86g). Guava fruit has a total sugar content of 8.92g. Vitamins listed include thiamine (0.067mg), riboflavin (0.04mg), niacin (1.084mg), and vitamin B6 (0.11mg). According to (Verma and Gupta, 2018) [15] Nutri masala candy had a moisture percentage of 0.21%, an ash content of 3.7g/100g, and protein and fat contents of 4.8g/100g and 1.07g/100g, respectively. The product has 6.2g of fiber per

100g, 90.22g of carbs per 100gm, and 386.98 calories. The product contains 10.65 milligrams of vitamin C per 100 grams.

**Nutritional evaluation of prepared product Herbal tea**

Value added Herbal tea is also determined their nutrient content from nutritive value of Indian food book published from NIN by ICMR (Gopalan *et al.*, 2023) [3]. The above Fig 3 shows the “t” value of control and best treatment for value added Herbal tea. The Fig 3 indicates a significant difference between the nutrient content of the control (T<sub>0</sub>) and the best treatment (T<sub>2</sub>) as the calculated value of “t” which was found to be for energy 34 kcal, vitamin C 5mg, calcium content 19mg, phosphorus content 36mg and iron content 0.77mg was higher than the tabulated value of “t” which is 4.303 at 5 percent probability level. It is quite obvious from the above Fig 2 that because of utilization of Rose petals, Hibiscus petals and Cinnamon an in different ratios resulted in improved nutritional content in value added Herbal tea. The result was supported by the findings of (Wikramasinghe *et al.*, 2015) [16] stated that Proximate analysis of fresh hibiscus flower petals revealed 89.34% moisture, 2.76% fat, 4.12% protein, 7.23% total ash, 10.75% fiber, and 877.04 mg anthocyanin content/100g.

**Graphic representation of Nutrients score of different attributes of per 100 ml of Herbal tea**



**Fig 5:** Nutrients score of different attributes of Herbal tea

#### Cost of the raw ingredients of Value added food products

The cost of the raw materials for preparing, value added Toffee/100 g was Rs.5.70 for T<sub>0</sub>, Rs.9.20 for T<sub>1</sub>, Rs.11.50 for T<sub>2</sub>, Rs.13.70 for T<sub>3</sub> and for preparing Herbal tea/100ml Rs.3.50 for T<sub>0</sub>, Rs.9.0 for T<sub>1</sub>, Rs.11.50 for T<sub>2</sub> and Rs.13.50 for T<sub>3</sub>. It is therefore concluded that T<sub>3</sub> had the highest cost of production followed by T<sub>2</sub>, T<sub>1</sub>, and T<sub>0</sub> being the cheapest among all the treatments because of the incorporation level of Rose petals and Hibiscus petals as they increased the price marginally.

#### Conclusion

The results has demonstrated that Rose petals and Hibiscus petals were successfully incorporated in the preparation of the value added "Toffee" and "Herbal tea". The Treatment T<sub>2</sub> of Toffee (Guava pulp + Rose petals extracts + Hibiscus petals extracts + Sugar + Lemon in the ratio of 40:15:10:30:5) and the Treatment T<sub>2</sub> of Herbal tea (Rose petals extracts + Hibiscus petals extracts + Jaggery + Tea granules + Cinnamon powder + Cardamom powder + Lemon in the ratio of 15:15:5:5:1:1) was found to be well acceptable. The nutrient contents, such as Calcium, Phosphorus, and Iron, increased significantly in "Toffee" and "Herbal tea". The levels of incorporation of Rose petals and Hibiscus petals increased the cost. It can be concluded utilization of Rose petals extracts, Hibiscus petals extracts, Cinnamon powder and Lemon juice beneficial for growing children and adolescents due to the essential nutrients contents like iron, calcium and phosphorus.

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