



Development of value-added cookies supplemented with giloy and tulsi powder

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ABSTRACT

Medical plants are widely used in various industries like agriculture, cosmetics, pharmaceuticals, and food. In some pandemic situations, every-one focused on developing immunity. The best way to increase the nutritional value of a person's daily diet is through a variety of ayurvedic practices. In this research conducted, herbal biscuits were developed. Cookies are eaten worldwide so it is the largest confectionary product and it is suitable for all age groups. In the present work, cookies are especially replaced with jaggery, wheat flour, and milk. Giloy stem powder was optimized by replacing whole wheat flour 100gm with (0.5gm, 1gm, 1.5gm, 2gm, 2.5gm, 3gm, 3.5gm, 4gm) and Tulsi leaves powder ((0.5gm, 1gm, 1.5gm, 2gm, 2.5gm, 3gm, 3.5gm, 4gm). Then final 1.5gm of giloy stem powder and 3gm of tulsi leaves powder were finalized based on sensory score. Both herbal powders which is an effective anti-aging herb. It also nourishes the skin. It is an anti-bacterial, antiviral and anti-fungal property that protects from a variety of infections. The use of this herbal powder focuses on developing organic products for human consumption and medicament.

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1. Introduction

Cookies are a popular form of bakery snack consumed all over the world for taste as well as nutrition. With long shelf life they also have high sugar and fat content thereby providing healthy nutrients. [1]. Due to fat rich content, they are highly susceptible to rancidity or oxidation. Hence, the quality of food deteriorates leading to unpleasant flavor, negative impact on health, and economic devaluation [2].

Creating novel meals by incorporating functional ingredients into a carrier food, like cookies, gives food producers better marketing prospects [3]. The majority of these investigations concentrate on organic substances having a range of physiological functions. It is intriguing to employ these herbs as food supplements due to their rising consumption. These herbs can provide a potent biochemicals including antioxidants, antimutagens, anticarcinogens and so on. [4,5].

Tinospora cordifolia Miers (Wild.) belonging to family Menispermaceae, is called by various local names in India such as giloy,

guduchi, or amrita. Ayurveda and conventional medicine highly regard this species for its wonderful therapeutic efficacy. [6]. India is home to this big deciduous climbing shrub whose extract is used as a treatment for a variety of illnesses, such as diabetes and hepatitis. This ancient herb giloy is rich in various phytochemicals such as ascorbic acid, lycopene alkaloids, terpenoids, lignans, carotene, etc. [7].

According to reports, giloy have phytochemicals having potent cytotoxic and immune-modulating properties. They work by stimulating immune cells exhibiting i-tumor effects. They increase the phagocytic activity of macrophages and boosts the generation of nitric oxide. According to Ayurveda, eating giloy with jaggery is more effective and cures the majority of ailments thereby lengthening a person's life. [8].

Additionally, the stem of giloy is used to treat a number of viral disorders as well as fever, jaundice, emaciation, skin conditions, diabetes, and anaemia. The proximate analyses of stem of giloy are carried out using standard methods, while mineral elements were analyzed using Atomic Absorption Spectrophotometer, equipped with air acetylene flame [9]. Numerous fascinating results have been published following thorough phytochemical,

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pharmacological, and clinical examinations into the substance [10].

The scented perennial plant *Ocimum sanctum* L. also known as tulsi, belongs to the Lamiaceae family. The medicinal relevance of these plants is due to their bioactive phytochemical components, which have specific physiological effects on the human body [11]. *Ocimum sanctum* has been used and is known as the “Queen of Herbs” since the beginning of Bangladesh’s ancient civilization. It has been employed in ayurvedic and traditional medicine since ancient times. Tulsi is grown for its aromatic leaves. Due to its numerous therapeutic characteristics, it has also significantly influenced contemporary study. The plant’s various parts have been proven to have antibacterial, anti-inflammatory, analgesic, antipyretic, antiulcer, antidiabetic, and anticancer properties. [12]. When coupled with vitamin C, tulsi has helpful antiviral and antibacterial properties. Tulsi leaves and jaggery are a great combo for treating viral infections of the digestive system as well as the common cold and flu. It is known to improve cardiovascular health, promote immunity, and speed up the healing process after infections [13].

Apart from many significant components present in plants, dietary fiber cannot be digested by human digestive enzymes present in the small intestine [14]. It is mostly a complex carbohydrate, is a crucial component of a balanced diet because it aids in the effective passage of food and waste through the digestive system. These are of two types, viz., soluble and insoluble dietary fibre. [15]. If the soluble dietary fibre is present in food, it dissolves in water and makes the passage of food slowly. It also aids in maintaining a healthy cholesterol level, normalizes blood sugar levels in diabetics, and may help reduce blood pressure. Gums and Pectins are examples of soluble fibers, and they are also found in herbs like Tulsi. [16].

Jaggery is frequently used in Indian families and boosts immunity. Minerals like zinc and selenium, which are known to have antioxidant properties, are found in jaggery [17].

Children in rural areas of developing countries like India are especially at risk since the food that is easily accessible to them does not support their ability to develop physically or to resist disease. According to research conducted by the Nutrition Monitoring Bureau and The National Institute of Nutrition in 12 Indian states, the rural population’s diets are inadequate and low in the majority of nutrients, including calories, vitamins, and other nutrients, particularly protein. [18].

2. Materials and methods

2.1. Materials

Refined wheat flour, jaggery, fat, baking powder, baking soda, and milk, were obtained from the local market of Manchar. Flavor powder was obtained from naturally giloy stem powder and tulsi leaves powder to prepared at the college level by using the tray dryer method. All chemicals and reagents used were of analytical grade.

2.2. Preparation of giloy stems powder

Giloy stems creeping over neem were collected and washed thoroughly. After the stem were washed under running water, disinfected for the rinsed. Giloy stem covering were removed manually or by using stainless steel knives and weighed to determine the yield. Material preparation and physico-chemical properties analyses were performed at the laboratory. After the weighed the giloy stem, was cut into small slices and then dried in a tray dryer

at 40 °C – 60 °C for 8 h and ground. The crushed material was sieved through a 50 mesh to obtain a powder. The giloy stem powder was again weighed to calculate the yield, then giloy stem powder was vacuum packed and stored at 4 °C for future analysis.

2.3. Preparation of tulsi leaves powder

Tulsi was collected near the farm of Manchar. It was washed under the running tap water and disinfected. Tulsi was weighed to determine the yield. Material preparation and Physico-chemical properties analyses were performed at the laboratory. After tulsi leaves were removed manually and then dried in a tray dryer at 40 °C – 65 °C for 24 h and grind. The crushed material was sieved through a 50 mesh to obtain a powder. The tulsi leaves powder was again weighed to calculate the yield, then tulsi leaves powder was vacuum packed and stored at 4 °C for future analysis.

2.4. Development of herbal cookies by supplementing giloy stem powder and tulsi leaves powder.

Herbal cookies were formulated using giloy stem powder and tulsi leaves powder. Giloy stem and tulsi leaves were collected from the college campus. They were further processed and used as ingredients for development of herbal cookies. Giloy stem powder, tulsi leaves powder, wheat flour, milk, baking soda, baking powder and salt was used as raw material for development of herbal cookies. See Fig. 1

3. Result and discussion

3.1. Optimization and development of herbal cookies

In the case of final cookies wheat flour, fat, baking powder, baking soda, salt, and milk, were kept constant while giloy stem powder was optimized by replacing whole wheat flour 100gm with (0.5gm, 1gm, 1.5gm, 2gm, 2.5gm, 3gm, 3.5gm, 4gm) Then final 1.5gm of giloy stem powder (trial 3) was finalized based on the sensory score. (Table 1).

Tulsi leaves powder was optimized by replacing whole wheat flour 100gm with ((0.5gm, 1gm, 1.5gm, 2gm, 2.5gm, 3gm, 3.5gm, and 4gm). The final 3 gm of tulsi stem powder (trial 6) was finalized based on the sensory score (Table 2). So sensory evaluation was done with the 1.5 % incorporation of giloy stem powder or 3 % of tulsi leaves. The powder was used development of herbal cookies. The prepared cookies were baked at 160 °C at the top and 150 °C at the bottom for 25 min in the baking oven. The baked cookies are cooled at room temperature and packed in LDPE and HDPE pouches for another analysis. Cookies were prepared with whole wheat flour to serve as a control.

3.2. Quality characteristics of cookies:

3.2.1. Physical analysis of cookies

The physical properties of Before and After cookies were analyzed for their weight using a balance (ELB3000, Shimadzu, Japan), and the Thickness(T) of the cookies (distance between top to the bottom surface of cookies) and Width(W) (distance across the cookies) were determined using Vernier caliper.

Giloy stem powder and tulsi leave powder in the herbal cookies were analyzed for weight, Diameter, thickness, and spread ratio, by following the respective procedures (AACC, 2000). [19].

Spread ratio – The spread ratio of baked cookies was determined by the ratio of width and ratio of thickness.

$$SF = W/T$$

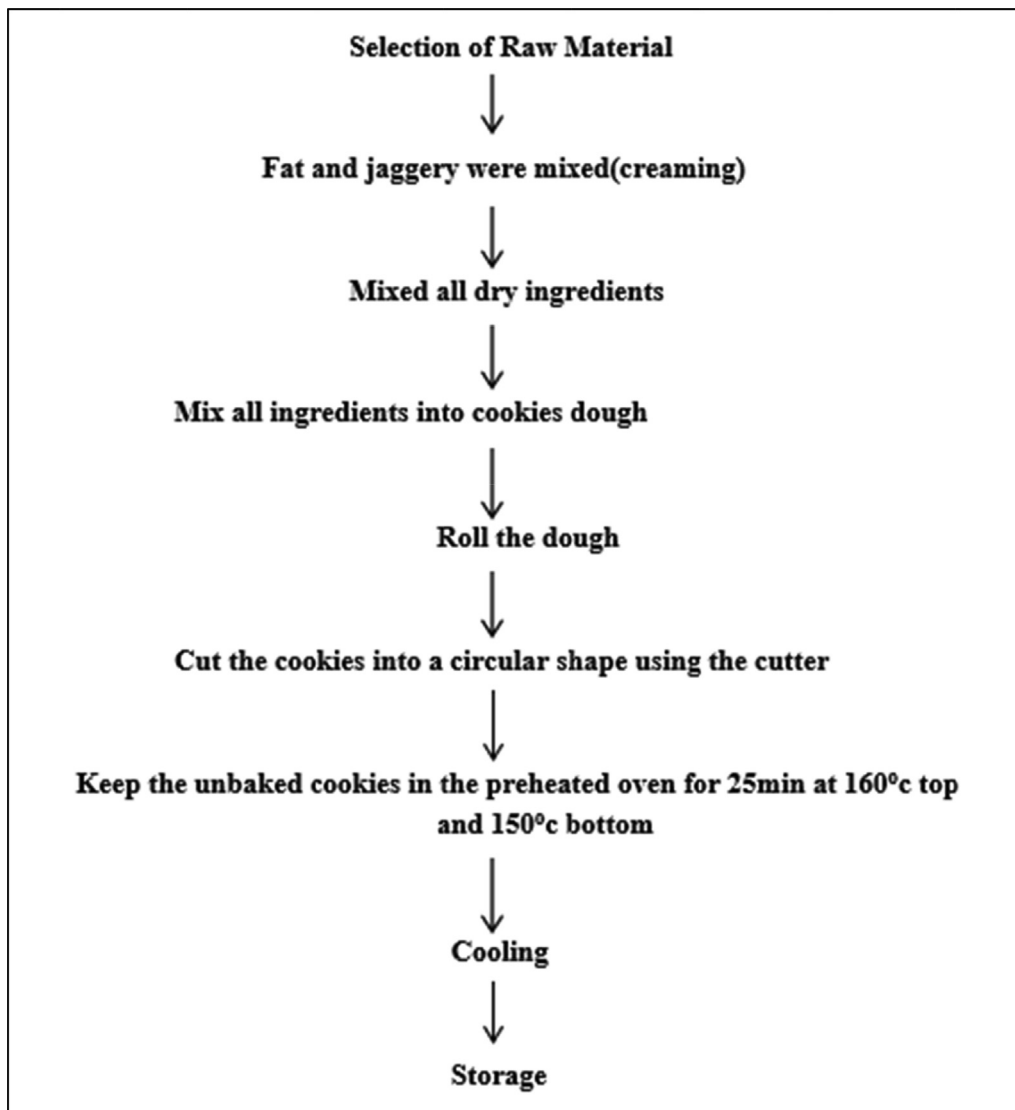


Fig. 1. Flowchart of preparation of cookies.

Table 1
Optimization of cookies based on Giloy stem powder.

Materials	T1	T2	T3	T4	T5	T6	T7	T8
Wheat flour	100	100	100	100	100	100	100	100
Fat	70	70	70	70	70	70	70	70
Baking soda	2	2	2	2	2	2	2	2
Baking powder	2	2	2	2	2	2	2	2
Milk	43	43	43	43	43	43	43	43
Salt	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Giloy powder	0.5	1	1.5	2	2.5	3	3.5	4
Tulsi powder	3	3	3	3	3	3	3	3

Table 2
Optimization of cookies based on tulsi leaves powder.

Materials	T1	T2	T3	T4	T5	T6	T7	T8
Wheat flour	100	100	100	100	100	100	100	100
Fat	70	70	70	70	70	70	70	70
Baking soda	2	2	2	2	2	2	2	2
Baking powder	2	2	2	2	2	2	2	2
Milk	43	43	43	43	43	43	43	43
Salt	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Giloy powder	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Tulsi powder	0.5	1	1.5	2	2.5	3	3.5	4

Results of the physical analysis of before and after cookies are shown in (Table 3) (Figs. 2,3). The product parameters like weight, thickness, width, spread ratio, and spread factor in the case of cookies have a direct relation to product uniformity, quality, and consumer acceptance [20]. The quality of cookies is widely determined by the spread factor. As shown in (Table 3). The highest spread ratio before cookies is (5.2) and the lowest spread ratio after cookies is (4.3).

3.3. Sensory evaluation of cookies:

Sensory evaluation of cookies added with giloy stem powder was done and the results were noted. (Table 4). The sample prepared by using 100 g whole wheat flour, 45 ml milk, 0.5 g salt, 2 g baking powder, 2 g baking soda, 50 g jaggery, and 70 g fat was used control sample. Baking this formulation at 160°C top and 150°C bottom for 25 min was used as a control procedure. The whole wheat flour was replaced with giloy stem powder at a level (0.5gm, 1gm, 1.5gm, 2gm, 2.5gm, 3gm, 3.5gm, and 4gm) of from the results of a sensory analysis it was observed that flavor, color, and the taste was affected significantly by addition 1.5gm of giloy stem powder selected.

Sensory evaluation of cookies added with tulsi powder was done and the results were noted. (Table 5). The sample prepared by using 100 g whole wheat flour, 45 ml milk, 0.5 g salt, 2 g baking powder, 2 g baking soda, 50 g jaggery, and 70 g fat was used control sample. Baking this formulation at 160°C top and 150°C bottom for 25 min was used as a control procedure. The whole wheat flour was replaced with tulsi stem powder at a level (0.5gm, 1gm, 1.5gm, 2gm, 2.5gm, 3gm, 3.5gm, and 4gm) of from the results of a sensory analysis it was observed that flavor, color, and taste were affected significantly by the addition of 3gm of Tulsi leaves powder selected.

3.4. Proximate composition of herbal Cookies:-

The proximate composition of refined wheat flour, giloy stem powder, and tulsi leaves powder was estimated using standard AACC methods [21]. Moisture: Estimation of moisture content is determined by using the hot air oven method at 105°C for 4 hrs. (AOAC, 1995). [21].

Ash: By using the muffle furnace method up to constant weight. Ignite in a muffle furnace at 550+/- 250c for 4 hrs. [22].

Fat: Extracting the sample in a Soxhlet apparatus for 6-8h using petroleum ether. The solvent is evaporated and the residue is weighed [22].

3.5. Shelf life study of prepared cookies:

The prepared cookies were packed in PP and LDPE bags at room temperature for the shelf life study (Fig. 4). The moisture content of cookies was analyzed at a regular interval of 15 days along with sensory analysis. Results summarized in the Sensory evaluation showed that prepared cookies were of good quality throughout the storage period. The sensory quality mainly in terms of taste

Table 3 Physical analysis of before and after cookies.

Parameter	Before cookies	After cookies
Weight	14.80	15.82
Thickness	5.2	6.1
Width	1.0	1.4
Spread ratio	5.2	4.3



Fig. 2. Cookies before baking.



Fig. 3. Cookies after baking.

Table 4 Sensory evaluation of giloy stem powder.

Attribute	Sensory Score								
	GP 0	GP 1	GP 2	GP 3	GP 4	GP 5	GP 6	GP 7	GP 8
Color	7	7	7.5	8.5	8	7.5	7	7.2	6.5
Texture	7.5	7.5	8	8	8	8	8	8	8
Taste	8	7.5	7.7	8.3	7.5	7	7.2	6.5	6
Flavor	7.5	7.5	8	8.5	8	7.5	7	6.5	6
Overall	7.5	7.3	7.8	8.3	7.8	7.5	7.3	7	6.6
Acceptability									

Table 5 Sensory evaluation of Tulsi leaves powder.

Attribute	Sensory Score								
	TL 0	TL 1	TL 2	TL 3	TL 4	TL 5	TL 6	TL 7	TL 8
Color	7	7	7.5	8	8	7.5	8.5	7.2	6.5
Texture	7.5	7.5	8	8	8	8	8	8	8
Taste	8	7.5	7.7	7.6	7.5	7	8.7	6.5	6
Flavor	7.5	7.5	8	7	8	7.5	8.5	6.5	6
Overall	7.5	7.3	7.8	8.2	7.8	7.5	8.5	7	6.6
Acceptability									

was decreased to some extent but the product was acceptable. There was a gradual increase in the moisture content during the storage period.



Fig. 4. Value added cookies supplemented with giloy powder and tulsi powder.

4. Conclusion

The use of giloy stem powder and tulsi leaves powder is partially replaced by whole wheat flour in the preparation of herbal cookies. They are supplemented with nutritional properties such as anti-cancer, anti-inflammatory, antioxidant, and anti-microbial properties and the richness of dietary fibers.

The found sensory evaluation, textural and color properties that the overall acceptability of 1.5 % giloy stem powder and 3 % of tulsi leaves powder based on herbal cookies. The herbal cookies are suitable for the best nutritional value as well as sensory score.

Ayurveda has several advantages in India. It helps the body digest food more easily while also preventing some illnesses and infections. In a pandemic emergency, every-one concentrates on building their body's energy and immune system in order to make herbal cookies that are both good for testing and beneficial to our health. Every generation consumes cookies on a daily basis, which is a terrific way for some medicinal components to originate from our bodies or our food.

Although the sensory evaluation of the prepared value-added cookies supplemented with giloy and tulsi powder have good acceptability rate, it is also important to analyze the composition of final product.

CRedit authorship contribution statement

Gawade Disha Sunil: Data curation, Investigation. **Patil Karuna Wasudeo:** Conceptualization, Methodology, Supervision. **Gavit Hemangi Jayram:** Visualization, Investigation.

Data availability

Data will be made available on request.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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