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Formulation of Health Food Products by incorporating *tulsi* leaves (*Ocimum sanctum*) and sunflower seeds (*Helianthus annuus*)

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Abstract: Unprecedented pandemic like COVID-19 created havoc worldwide, leading to short term as well as long term physical, psychological and social health implications. The poor immunity increased the mortality and post-COVID associated morbidities. This calls for enhancing immunity for general wellbeing. Host of studies have proved that Indian medicinal plants viz. giloy, tulsi, Ginger, Curcumin, aloevera are efficient in boosting up the immunity. In the present study, two food products laddoo (a sweet) and cookies were developed by utilizing tulsi leaves powder and sunflower seed powder, respectively. Tulsi leaves (Ocimum sanctum) also known as "Mother Medicine of Nature," and sunflower seeds (Helianthus annuus) are known to boost the immunity and possess medicinal properties. The health food products viz. laddoo was developed by incorporating 1% (S2), 3% (S3) and 5% (S4) of tulsi leaves powder and cookies were developed by incorporating 20% (C2), 30% (C3) and 40%(C4) of sunflower seed powder. S1 and C1 served as standard laddoo and cookie, respectively. The formulated health food products were assessed for the organoleptic properties using sensory scores and nutritional composition was computed. The results showed that among all the samples of laddoo, S2 (Wheat flour: tulsi powder as 99:1) was most acceptable and the nutritional values revealed that S4 had highest iron content due to more incorporation of tulsi powder and S2 (Wheat flour: tulsi as 99:1) had highest zinc content. In case of Cookies, C3 was most acceptable. It was seen that as the incorporation of sunflower seed powder increased, the nutritive value for energy, protein, calcium, and vitamin C increased. C4 (Wheat flour: sunflower seeds as 60:40) had highest energy, protein, calcium and vitamin C content. Thus, it can be concluded that tulsi leaves powder and sunflower seeds powder can be effectively incorporated to formulate value added food products.
Keywords- Ocimum sanctum, Helianthus annuum, laddoo, Cookies, sensory evaluation, nutritional composition.

Introduction

The rapid changing lifestyle coupled with unprecedented pandemic like COVID-19 has brought the mankind at the brink of fatal diseases and death. In case of any contagion, immunity plays an important role in maintaining health and therefore it is crucial to boost immunity by natural means. It is seen that various plants like *giloy*, *tulsi*, *ashwagandha, mulethi, aloevera*, *amla, daalchini,* cloves, garlic, turmeric, cinnamon and ginger *etc*. are efficient in boosting immunity. Seeds like sunflower seeds (*Helianthus annuus*), sesame seeds (*Sesamum indicum*), hemp seeds (*Crotalaria juncea*), chia seeds (*Salvia hispanica L.*), pumpkin seeds (*Cucurbita pepo L.*) along with certain herbs and spices possess medicinal properties viz. antioxidative, anti-
viral, anti-bacterial, anti-fungal, anti-diabetic, anti-lipidemic etc.

Tulsi has nutraceuticals properties and is commonly of two varieties – the green coloured **Lakshmi *tulsi*** and the purple hued **Krishna *tulsi***. *Tulsi* has the ability to counter, chemical, physical, psychological and metabolic stress.**(Cohen, 2014).**

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infections, skin diseases and it has variety of vitamins and minerals like calcium, copper, iron, magnesium, manganese, selenium, phosphorous, potassium, sodium and zinc. **(Man et.al., 2017).** Considering the importance of functional foods in management of health, the present study deals with the formulation of immune boosting health food products.

Material And Methods

The study was conducted at SAPKM College, Department of Home Science, Kiccha (U.S.Nagar) during June 2020 to January 2021 and household level(due to pandemic).

Tulsi leaves (*Ocimum sanctum Linn.)* and Sunflower seeds (*Helianthus annuus L.*). were selected on the basis of their functional properties. Raw ingredients i.e. *tulsi* leaves and sunflower seeds were procured from home kitchen garden and the local market of Haldwani city, Uttarakhand, respectively. The samples were cleaned manually to remove foreign materials such as dirt, small stones, dust, immature seeds etc. and then washed in running water. Leaves of *tulsi* and sunflower seeds were dried in shades. Both samples were ground using a mechanical grinder for making it into powdered form.

Two products- *laddoo* (a sweet) and cookies were developed by incorporating *tulsi* leaves and sunflower seeds, respectively. Sensory evaluation of the food products was carried out by 9-point hedonic scale using the following attributes like colour, flavour, texture, taste, appearance and overall acceptability. Sensory evaluation was done by trained and semi-trained members. The evaluation was conducted in proper lighting and water was provided after testing each sample to remove any other taste.

Nutritive values viz. energy, protein, iron, calcium, zinc, selenium, Vitamin A and C content using table values given by Gopalan et al, 2007 and based on reviews (Man et al, 2017; Sabita and Puraikalan, 2014; Shafqatullah et al,2013) were estimated. The data was analysed using statistical techniques like percentage and mean.

Fig.1. Processing of *tulsi* leaves

Fig.2. Processing of sunflower seed

Fig.3. Sensory evaluation by trained members

Results And Discussion

The results have been discussed on the basis of following subheadings–

1. Formulation of health food products

Two products i.e. Cookies and *laddoo* were prepared with their four variations including standard sample.

A) Cookies- Cookies were prepared by using a ratio of wheat flour and sunflower seeds powder as 100:0 in sample C1,80:20 in sample C2,70:30 in sample C3 and 60:40 in sample C4. Other ingredients like butter, sugar, cardamom powder, baking powder and milk used in same proportions in all four products.

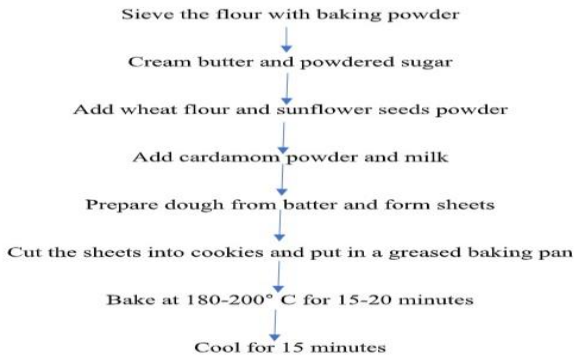


Fig:4 Procedure used to prepare cookies

Formulated Cookies

B) *Laddoo* - *Laddoos* were prepared by using ratio of wheat flour and *tulsi* powder. Four variations were prepared as sample S1 (wheat flour :*tulsi* powder in the ratio of 100:0), sample S2 (wheat flour : *tulsi* powder in the ratio of 99:1), sample S3 (wheat flour : *tulsi* powder in the ratio of 97:3) and

sample S4 (wheat flour : *tulsi* powder in the ratio of 95:5). Other ingredients like ghee and sugar powder were included in same amount in all samples.

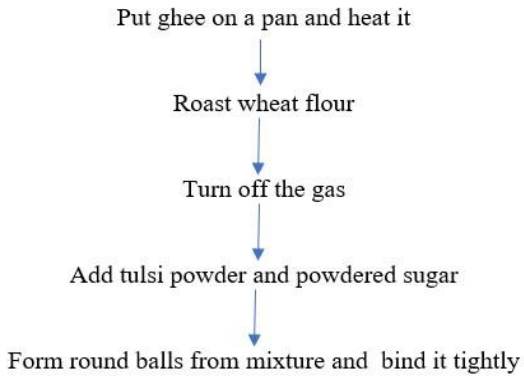


Fig:5 Procedure used to prepare *laddoo*

Formulated *laddoo*

2. Sensory evaluation of the food products

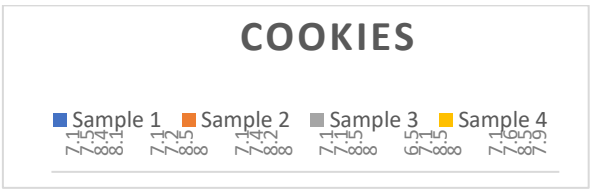
A) Mean score of sensory evaluation of Cookies - Sample C3 **(wheat flour: sunflower seeds powder as 70:30)** scored highest in terms of colour, flavour, texture, taste, appearance and overall acceptability. Among all the four variations. sunflower seeds powder incorporated at 30% scored highest.

Acceptability	Maximum Score	Sample 1	Sample 2	Sample 3	Sample 4
Colour	10	7.1	7.5	8.4	8.1
Flavour	10	7.1	7.2	8.5	8.0
Texture	10	7.1	7.4	8.2	8.0
Taste	10	7.1	7.1	8.5	8.0
Appearance	10	6.5	7.1	8.5	8.0
Overall acceptability	10	7.1	7.6	8.5	7.9

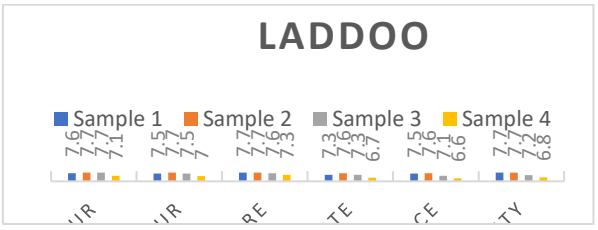
B) Mean score of sensory evaluation of *Laddu*- Sample S2 and S3 in which *tulsi* powder was incorporated at 1 and 3 percent scored same as control i.e liked moderately whereas sample S4 in which *tulsi* powder was incorporated at 5 percent was liked slightly due to it's pungent and bitter taste and might be probably the reason for lower acceptability.

Acceptability	Maximum Score	Sample 1	Sample 2	Sample 3	Sample 4
Colour	10	7.6	7.7	7.7	7.1
Flavour	10	7.5	7.7	7.5	7.0
Texture	10	7.7	7.7	7.6	7.3
Taste	10	7.3	7.6	7.3	6.7
Appearance	10	7.5	7.6	7.1	6.6
Overall acceptability	10	7.7	7.7	7.2	6.8

A) Graphical representation of mean scores of cookies.



B) Graphical representation of mean scores of *laddoo*.



3. Nutritive values of formulated health food products-The nutritive value of all the eight formulated health food products were calculated using nutritive value of ingredients as per **(Gopalan et al.,2007)**

A) Nutritive values of cookies - It was seen that as the incorporation of sunflower seed powder increased, the nutritive values for energy, protein, calcium, vitamin C increased. Sample 4 (wheat flour: sunflower seeds as 60:40) have highest energy, protein, calcium and vitamin C values. The sample 3 which was most acceptable had a energy content of 752.99 kcal, 15.82 gm protein, 5.06 mg Iron, 184.9 mg Calcium, 1.56 mg zinc, 85.4 mg selenium and 0.3 mg of Vitamin C.

Ingredients	Energy (Kcal)	Protein (g)	Calcium (mg)	Vit. C (mg)
Sample 1	669.29	13.51	115.3	-
Sample2	725.09	15.05	161.7	0.2
Sample 3	752.99	15.82	184.9	0.3
Sample 4	780.89	16.59	208.1	0.4

B) Nutritive values of *laddoo* -Addition of *tulsi* to product enhanced the antioxidative potential of developed food products. The incorporated percentage of *tulsi* powder increased iron and vitamin C content values. Sample 4 have 5.47 mg of iron and 1.25 mg of Vitamin C. Tulsi is also a good source of iron and it has anti-anaemic activity. Vitamin C helps in wound healing, protect cells and maintaining healthy skin, blood vessels, bones and cartilage. Tulsi is found to be rich in flavonoids and phenols which show antioxidant property **(Agarwal et al, 2017).**

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Ingredients	Energy (Kcal)	Iron (mg)	Zinc (mg)	Vit. C (mg)
Sample 1	990	4.97	2.2	-
Sample 2	986.8	5.07	2.17	0.25
Sample 3	980.67	5.2	2.13	0.75
Sample 4	974.45	5.47	2.09	1.25

Conclusions

Use of herbs and medicinal plants in our daily diet boosts the immunity and improve nutritional status. A strong immune system combat the spreading of pathogens. Besides, good nutritional

composition, these health food products provide ability to fight against many pathogens in the human body. *Tulsi* and sunflower seeds posses functional and medicinal activities like immunomodulatory, anti- inflammatory, anti-diabetic, anti-lipidemic, anti-cancer etc. owing to presence of certain phytochemicals. Therefore, these developed food products can serve to be an excellent health foods.

Future Scope

The formulated food products i.e. Cookies and *laddoo* in this study can be sold commercially to improve the nutritional status. Formulated products have immune boosting properties.

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Conflict of interest. None.