International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 4 July-Aug 2023, pp: 1543-1548 www.ijprajournal.com ISSN: 2249-7781

Biochemical and sensory profile of developed functional cookies enriched with sweet basil herb

Manshi*, Sheel Sharma
*Corresponding Author
* Research Scholar; Professor
Department of Food Science and Nutrition,
Banasthali Vidyapith, Rajasthan-304022, India

Submitted: 01-08-2023 Accepted: 10-08-2023

ABSTRACT
Several different industries, including agriculture, cosmetics, medicines, and food, use medicinal plants extensively. When there was a pandemic, everyone concentrated on building immunity. Incorporating a wide variety of ayurvedic techniques is the best approach to improve the nutritional content of a person's typical diet. Functional cookies have been developed in this investigation. Functional cookies are the most popular confectionery item and are enjoyed by people of all ages since they are consumed internationally. The functional cookies in the current experiment are specifically substituted with wheat flour, jaggery, milk, and tulsi leaf powder, which was optimised by substituting 100 g of whole wheat flour with (1g, 1.5g, 2g, 2.5g, 3g, and 3.5g) of each, respectively. On the basis of the sensory evaluation using a 9-point hedonic scale, the final 3g of tulsi leaf powder were finalized. The results revealed that adding 3g of basil powder to cookies considerably improved their biochemical and sensory qualities.
Keywords: Biochemical properties, sensory, functional cookies, tulsi

I. INTRODUCTION

Ocimumbasilicum is a Lamiaceae plant that can be found in Africa, tropical Asia, South America, and focal America. It has an exceptionally outstanding sweet and spicy aroma and is frequently cultivated as a fixing or for the production of medicinal oil. In addition to its use as a condiment, this plant has been associated with other health advantages. In modern medicine, it is used to treat gastrointestinal colic, retching, loose stools, and female spasms. It can also improve renal function. Some studies have shown that it has benefits for treating hyperlipidemia, including anti-inflammatory, antioxidant, vasodilator, neuroprotective, and hepatoprotective characteristics (Barbalho et al., 2012).

Basil seeds contain flavonoids and phenolic substances, both of which seem to have antioxidant qualities. Antioxidants are compounds the body can use to fight against free radicals, unstable molecules that can harm cells (Akshatha et al., 2019). Oxidative stress brought on by free radicals has been linked to cardiovascular disease, neurological disorders, and various malignancies. Preliminary studies suggest that basil seeds may possibly possess interesting antimicrobial capabilities. In a study, it was discovered that the seeds were most effectively destroyed by the pneumonia-causing bacterium Pseudomonas aeruginosa. Fatty acids found in basil seeds may have extra health advantages. According to Christaki et al. (2012), they are particularly high in the important fatty acid alpha-linolenic acid (ALA). Sweet basil is a fragrant herb that can be utilised in a variety of settings as a raw material, spice, ornamental plant, and medicinal. Due to its high economic value and demand, sweet basil is the most significant of the basil species that are extensively cultivated. In several areas of the food and beverage industries, the fragrant leaf of sweet basil is used directly as a flavour agent (Egata, 2021).

Functional cookies are a widely used bakery snack that people consume all over the world for both taste and nutrition. They have a long shelf life and a high sugar and fat content, which makes them a good source of nutrients (Okpala et al., 2012). Due to their high fat content, they are very inclined to oxidation or rancidity. As a result, food quality declines, which has a detrimental effect on flavour, health, and the economy (Ullah et al., 2003). Food producers have improved marketing opportunities when they create unique meals using functional components in a carrier food, like functional cookies (Krutulyte et al.,

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 4 July-Aug 2023, pp: 1543-1548 www.ijprajournal.com ISSN: 2249-7781

2011). Most of these investigations focus on chemical compounds with various physiological properties. Due to their increased usage, it is exciting to use these plants as food supplements.According to Sharma and Patel (2013), these herbs have powerful biochemical properties that include antioxidants, anti-mutagens, anti-carcinogens, and more. Nowadays, the emphasis is on functional cookies that contain more protein, enhance dietary fibre consumption, have high resistant starch levels, and have fewer calories and carbohydrates than other baked goods. Tulsi is added to the mixture of whole wheat flour, jaggery, fat, baking powder, baking soda, and milk to make functional cookies. All of these components will contribute unique colour, texture, and nutritional content that may be advantageous in baked goods, recipes, and other culinary products. Because the composite flours could decrease wheat imports and boost the potential use of locally grown crops, they are beneficial to developing nations (ArifulAlam et al., 2014).

II. MATERIALS AND METHODS

Materials

Wheat flour, Jaggery, fat, baking powder, baking soda, and milk were obtained from the market of New Delhi. Tulsi leaves powder to prepare at the college level by using the tray dryer method. All chemicals and reagents used were of analytical grade.

Preparation of tulsi leaves powder

Tulsi was collected from the botanical garden of Banasthali Vidyapith, Rajasthan. It was washed under the running tap water and disinfected and weighed. Material preparation and physicochemical 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 and powder was stored in an airtight container at 4 °C for further experiments (Katte et al., 2021).

Development of functional cookies by incorporation of tulsi leaves powder

Functional cookies were formulated using tulsi leaves powder. Tulsi leaves were collected from the banasthali vidyapith campus. Leaves were further processed and used as ingredients for development of functional cookies. Tulsi leaves powder, wheat flour, jaggery, milk, baking soda, baking powder and salt was used as raw material for the development of functional cookies. See Fig. 1

Selection of raw materials

Mixing of all dry ingredients with fat and jaggery paste

Make a dough

Roll the dough

Cut the functional cookies into the uniform shape

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 4 July-Aug 2023, pp: 1543-1548 www.ijprajournal.com ISSN: 2249-7781

Keep the unbaked functional cookies into the oven (preheated for 25min at 160°ctop and 150°c bottom)
Cooling

Store functional cookies into the airtight container

Figure 1: Flow chart of making functional cookies

Development and augmentation of functional cookies

In the case of final functional cookies wheat flour, jaggery, fat, baking powder, baking soda, salt, and milk were kept constant while tulsi leaves powder was optimized by replacing whole wheat flour 100g with (1g, 1.5g, 2g, 2.5g, 3g and 3.5g) (Table 1). The final 3 gm of tulsi stem powder was finalized based on the sensory score (Table 2). So sensory evaluation was done with the incorporation of 3 % of tulsi leaves powder for the development of functional cookies. The prepared functional cookies were baked at 160° C in the oven. The baked functional cookies are cooled at room temperature and packed in an airtight container for further analysis. (Mehta, 2013).

Materials	T1	T2	T3	T4	T5	T6
Wheat flour	100	100	100	100	100	100
Milk	40	40	40	40	40	40
Salt	0.25	0.25	0.25	0.25	0.25	0.25
Baking powder	1.5	1.5	1.5	1.5	1.5	1.5
Baking soda	1.5	1.5	1.5	1.5	1.5	1.5
Fat	55	55	55	55	55	55
Jaggery	5	5	5	5	5	5
Tulsi leaves powder	1	1.5	2	2.5	3	3.5

Table 1:Development and augmentation of functional cookies by incorporation of tulsi powder

Organoleptic evaluation of functional cookies

Using the 9-point hedonic test, sensory evaluation of the samples was performed. The panellist was given a coded sample and asked how much they liked or didn't like specific product characteristics such colour, texture, flavour, and general acceptability. According to Shuchi et al.'s (2017) evaluation of the qualities, like exceedingly (means the score is 9 out of 9) and dislike excessively (means the score is 0 out of 9) were used.

Biochemical analysis of functional cookies

Standard methods of AOAC were used to determine the biochemical analysis of functional cookies. Ash content was analyzed by the combustion method; protein content (Nx6.25) was determined by the micro Kjeldahl method, fibre by AOAC method whereas moisture and total solid by drying method (AOAC, 2000).

Physical analysis of functional cookies

The physical properties of before and after functional cookies were analyzed for their weight using a balance, thickness (T) of the functional cookies and width (W) were determined using Vernier calliper. Functional cookies were analyzed for weight, Diameter and thickness by following the respective procedures (AACC, 2000).

III. RESULTS AND DISCUSSIONS

Organoleptic evaluation of functional cookies

Table 2 showed the results of organoleptic evaluation of functional cookies. Treatment 5 with incorporation of 3g tulsi leaves powder had higher sensory score in terms of colour (8±0.02), texture (8.5±0.03), taste (8±0.02), flavour (8.5±0.02) and overall acceptability (8.5±0.03) whereas T1 scored the lowest in sensory score in terms of colour (7±0.01), texture (7.5±0.02), taste (7±0.01), flavour (7±0.02) and overall acceptability (7.2±0.01) respectively. In comparison to other formulations, the biscuits created by Sandhya and Waghray(2018) with 10 g of soy and 8 g of a herbal blend were determined to be more palatable. The herbal biscuits that were made had good colour and texture qualities. With the addition of soy flour, the biscuit's protein level increased proportionately. In comparison to the control biscuits without any fortification, coriander-fortified biscuits scored lower in terms of appearance, scent, texture, taste, and overall acceptability, according to Deepali and Roji (2019).

Table 2:Organoleptic evaluation of functional cookies

Sensory parameters	Parameters						
	Control	T1	T2	T3	T4	T5	T6
Colour	7±0.02	7±0.01	6±0.02	7±0.02	7.5±0.02	8±0.02[a]	7±0.02
Texture	7±0.01	7.5±0.02	7±0.03	7.5±0.02	7±0.03	8.5±0.03 [a]	7±0.03
Taste	7.5±0.02	7±0.01	7.5±0.04	7.5±0.03	7.5±0.02	8±0.02 [a]	6.5±0.02
Flavour	7±0.03	7±0.02	7±0.01	7.5±0.02	7±0.02	8.5±0.02 [a]	6±0.03
Overall acceptability	8±0.02	7.2±0.01	7.5±0.01	7.5±0.01	8±0.03	8.5±0.03 [a]	7±0.01

Data are significant at ($p<0.05$)Results were shown as mean ± standard deviation

Biochemical analysis of functional cookies

Table 3 states that, Nutrient contents of control and functional cookies that were estimated by using different analytical methods. Control cookies contain (4.7±0.11) moisture, (2.5±0.22) fibre, (15.3±0.25) protein, (18.2±0.21) fat, (1.69±0.31) ash but in functional cookies nutritive value was improved after adding the tulsi powder table 3 shows the nutrient content of the functional cookies and its was observed that T5 have a significant and acceptable amount of nutrient as (2.7±0.32) fibre, (15.9±0.415) protein (18.6±0.31) fat, (1.79±0.35) ash respectively. According to Thorat et al. (2017), there was an increase in the amount of moisture, protein, ash, crude fibre, and carbohydrates. These findings agreed with studies that showed that, with the exception of fat, all other nutritional contents increased when herbs were added ShuchiUpadhyay et al., (2017). According to Zaker et al. (2017), biscuits made with orange peel powder demonstrated better nutritional quality than the control biscuits.

Table 3:Biochemical analysis of functional cookies

Nutrients (g)	Control	T1	T2	T3	T4	T5	T6
Moisture	4.7±0.11	4.1±0.33	4.4±0.23	4.3±0.21	4.4±0.31[c]	4.3±0.31[a]	4.5±0.39[b]

Fat	18.2±0.21	17.2±0.18	16.8±0.25	17.5±0.29^{c}	16.5±0.27	18.6±0.31^{a}	17.7±0.38^{b}
Protein	15.3±0.25	14.2±0.41	14.4±0.29	14.6±0.31	14.7±0.38^{c}	15.9±0.41^{a}	15.9±0.47^{a}
Ash	1.69±0.31	1.53±0.25	1.54±0.27	1.48±0.35	1.57±0.37^{c}	1.79±0.35^{a}	1.78±0.39^{b}
Fibre	2.5±0.22	1.9±0.23	2.1±0.28	2.1±0.24	2.2±0.29^{c}	2.7±0.32^{a}	2.6±0.39^{b}

Data are significant at ($p<0.05$) Results were shown as mean ± standard deviation

Physical analysis of functional cookies

Results of the physical analysis of before and after functional cookies are shown in (Table 4). Functional cookies' weight, thickness, and width are directly related to the product's uniformity, quality, and consumer approval. According to Ingle et al. (2017), there were no appreciable variations in the diameter and thickness of the cookies between those having up to 7.0% beetroot powder. According to Ajila et al. (2008), the amount of mango peel powder in cookies had a small impact on the cookies' thickness, diameter, and spread ratio.

Table 4:Physical analysis of functional cookies

Physical parameter	Pre	Post
Weight	13.39±0.96	14.50±0.98
Thickness	6.1±0.28	6.8±0.23
Width	1.3±0.01	1.8±0.01

Data are significant at ($p<0.05$) Results were shown as mean ± standard deviation

IV. CONCLUSIONS

In India, Ayurveda offers a number of benefits. It promotes digestion more easily in the body and protects against several diseases and infections. In the situation of a pandemic, everyone focuses on boosting their body's energy and immune system in order to create herbal functional cookies that are both good. The addition of nutritional benefits like anti-cancer, anti-inflammatory, antioxidant, and anti-microbial qualities as well as a high content of dietary fibre to herbal cookies made with tulsi leaf powder. According to biochemical study and sensory evaluation, it has been found that adding 3% of tulsi leaf powder to herbal cookies gives them the optimum nutritional value and sensory rating.

Declaration- There is no conflict of interests between the authors.

REFERENCES

1. Barbalho, S. M., Machado, F. M. V. F., Rodrigues, J. D. S., Silva, T. H. P. D., &Goulart, R. D. A. (2012). Sweet basil (Ocimumbasilicum): Much more than a condiment. CellMed, 2(1), 3-1.
2. Akshatha, D. S., Naik, R. S., Chethana, B., &Brundha, A. (2019). A study on nutritional, functional and anti-nutritional properties of basil seed incorporated products.
3. Christaki, E., Bonos, E., Giannenas, I., &Florou-Paneri, P. (2012). Aromatic plants as a source of bioactive compounds. Agriculture, 2(3), 228-243.
4. Egata, D. F. (2021). Benefit and use of sweet basil (OcimumBasilicum L.) in Ethiopia: a review. J. Nutr. Food Proces, 4(5), 57-59.
5. Okpala, L. C., &Okoli, E. C. (2014). Development of cookies made with cocoyam, fermented sorghum and germinated pigeon pea flour blends using response surface methodology. Journal of Food Science and Technology, 51, 2671-2677.
6. Ullah, J., Hamayoun, M., Ahmad, T., Ayub, M., &Zafarullah, M. (2003). Effect of light, natural and synthetic antioxidants on

stability of edible oil and fats. Asian Journal of Plant Sciences.

7. Krutulyte, R., Grunert, K. G., Scholderer, J., Lähteenmäki, L., Hagemann, K. S., Elgaard, P., &Graverholt, J. P. (2011). Perceived fit of different combinations of carriers and functional ingredients and its effect on purchase intention. Food Quality and Preference, 22(1), 11-16.
8. Sharma, V. J., & Patel, P. M. (2013). Evaluation of antibacterial activity of methanolic extract of plant Riveaornata. International Research Journal of Pharmacy, 4, 233-234.
9. Alam, M., Alam, M., Hakim, M., Huq, A. O., &Moktadir, S. G. (2014). Development of fiber enriched herbal biscuits: a preliminary study on sensory evaluation and chemical composition. Int J Nutr Food Sci, 3, 246-50.
10. Katte, A. T., Chavan, U. D., Adsure, P. R., Andale, S. S., &Musale, S. V. (2021). Studies on sensory and nutritional quality of cookies prepared with jamun powder. The Pharma Innovation Journal, 10(12), 765-768.
11. Mehta, M. (2013). Development of low cost nutritive biscuits with Ayurvedic formulation. International Journal of Ayurvedic and Herbal Medicine, 3(3), 1183.
12. Shuchi U, Soobia AK, Rajeev T, Sanjay K, Deepikakohli, IR, Poonam M, Richa B, (2017). Nutritional and sensory evaluation of herbal cookies. Int J Food SciNutr, 2(6): 156–160, doi.org/https://doi. org/10.22271/food
13. Association of Official Analytical Chemists (AOAC). Official Methods of Analysis of AOAC International, 17th ed.; AOAC International: Gaithersburg, MD, USA, 2000.
14. American Association of Cereal Chemists. Approved Methods Committee. (2000). Approved methods of the American association of cereal chemists. AACC.
15. Sandhya, A. E., &Waghray, K. (2018). Development of sorghum biscuits incorporated with spices. International Journal of Food Science and Nutrition, 3(2), 120-128.
16. Deepali M, Roji W (2019) .The fortification of biscuits with coriander leaf powder and its effect on physico-chemical, antioxidant, nutritional and organoleptic characteristics. Int J Food Stud, 9: 225–237
17. Thorat PP, Sawate AR, Patil BM, Kshirsagar RB (2017).Effect of lemongrass powder on proximate and phytochemical content of herbal cookies. J PharmacognPhytochem 6(6):155–159.
18. Zaker MA, Sawate AR, Patil BM, Sadawarte SK, Kshirsagar RB (2017). Effect of orange peel powder incorporation on physical, nutritional and sensorial quality of biscuits. Food Sci Res J 8(2):160–165. https://doi.org/10.15740/HAS/FSRJ/8.2/160-165
19. Ingle, M., Ingle, M.P., Thorat, S.S., Nimbalkar, C.A and Nawkar, R.R. (2017). Nutritional evaluation of cookies enriched with beetroot (Beta vulgaris L.) powder. International Journal Current Microbiology and Applied Science 6(3):1888-1896.
20. Ajila, C. M., Leelavathi, K. and Prasada Rao, U.J.S. (2008). Improvement of dietary fiber content and antioxidant properties in soft dough biscuits with the incorporation of mango peel powder. Journal of Cereal Science 48:319-326.