



Journal Homepage: -www.journalijar.com
**INTERNATIONAL JOURNAL OF
 ADVANCED RESEARCH (IJAR)**

Article DOI: 10.21474/IJAR01/6841
 DOI URL: <http://dx.doi.org/10.21474/IJAR01/6841>



RESEARCH ARTICLE

FORMULATION AND QUALITY EVALUATION OF COOKIES FROM DRUMSTICK LEAF POWDER AND CAULIFLOWER LEAF POWDER.

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Manuscript Info

Manuscript History

Received: 04 February 2018
 Final Accepted: 06 March 2018
 Published: April 2018

Keywords:-

Drumstick Leaf Powder (DLP),
 Cauliflower Greens Leaf Powder
 (CGLP), β -Carotene, Vitamin C,
 Calcium, Iron.

Abstract

In the present fast growing rapidly changing global society, attaining good health has become a challenge for all age groups. Now a day's Consumption of foods made from the leaves has increased, but still, few are considered as wastes, but they are actually beneficial for health. The study was made to utilize two types of leaves (drumstick leaf powder & cauliflower leaf powder) in different from the value-added product, thus reducing the wastage and providing inexpensive, healthy bakery product (cookies). Drumstick leaves are a highly nutritious green leafy vegetable. Drumstick leaves (*Moringa oleifera*) are considered a significant source of β -carotene, vitamin C, protein, iron, potassium, calcium. Cauliflower Greens (*Brassica oleraceae var. Botrytis*) are rich in iron, and iron. The refined wheat flour was blended with DLP and CGLP in a different recipe in the ratios of 35, 45, and 55% for the development of cookies. Prepared Moringa cookies were good source β -carotene, protein, and vitamin C, whereas Brassica cookies were a good source of calcium and iron.

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Introduction:-

In India, consumer's perspective on selecting foods has changed. Most of the studies in India analyze prices and expenditure as one of the important factors affecting food consumption pattern and less attention has been paid to socioeconomic and regional variables, which may incur differences in food consumption pattern. They are very particular about the food they consume that will lower the risks of metabolic syndrome and at the same time help those to stay slim vital and attractive throughout their lifetime. In the present fast growing rapidly changing global society, attaining good health has become a challenge to all age groups because of the prevalence of several chronic diseases. Growing awareness about the role of diet and the consequences of inadequate nutrition has led the food industry to develop new products which work like medicine. A Consumer demands for nutritious, convenient and safe foods is increasing day by day. In determining food consumption and nutrition intake, many of Indian studies focus on food prices, expenditure level, and income and very few of them incorporate regional factor, which not only reflects the distinct production and price pattern but also show sharp cultural differences.

DLP and CGLP were the cheap and good source of nutrients, available at everywhere. Table 1 represented the nutritive value of both leaf powders. Among all the bakery products, cookies are the most popular foodstuff will cherish by all the population due to their long shelf life and low cost. Cookies are always hygienically packaged

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nutritious snack food available at very competitive prices, volumes and different tastes. The purpose of this review was to develop a value-added product.

Methods and Material:-

Raw materials collection and preparation:-

Fresh leaves of Drumstick (*Moringa Oleifera*) and cauliflower (*Brassicca Olearacea var. Botrytis*) were procured from local market. The other consumable products, sugar, fat were obtained.

Preparation of leaf powders:-

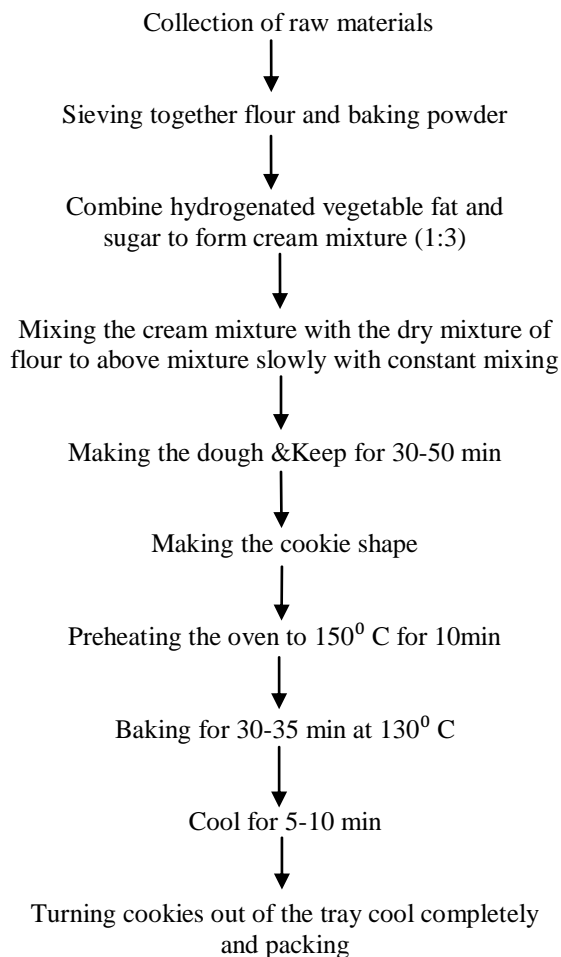
Raw drumstick leaves and cauliflower greens are washed in running water. Both leaves are dried in a hot air oven maintained at 50⁰ C for 3-5 hours. The dried leaves were ground to a fine powder using electric grinder stainless steel and sifted through 60 meshes. Thus prepared the flour used in required quantities for preparation of cookies.

Formulations:-

1. **M1** – refined wheat flour: DLP (45:55)
2. **M2** – refined wheat flour: DLP (55:45)
3. **M3** – refined wheat flour: DLP (65:35)
4. **B1** – refined wheat flour: CGLP (45:55)
5. **B2** – refined wheat flour: CGLP (55:45)
6. **B3** – refined wheat flour: CGLP (65:35)

Cookies formulation and preparation:-

Flowchart:-



Moringa cookies and Brassica cookies each were prepared as a different recipe. Three different formulations of refined wheat flour: DDLP for Moringa cookies and refined wheat flour: DCGLP for Brassica cookies in 45:55, 55:45, 65:35 proportions. For the preparation of cookies, sugar and fat (in the ratio 1:3) were mixed until creamy. Next, refined wheat flour, leaf powder mix put into the mixture of sugar and fat. They were uniformly mixed to obtain consistent dough. The dough was rolled out and cut using a cookie cutter. The cookies were baked in oven for 30-35 min at 130⁰ C then cooled at room temperature. After those cookies were packed in polyethylene pouches and sealed for further analysis.

Table1:- Nutritive value of DL & CG

Component	DL	CG
Moisture (g)	75.9	80
Protein (g)	6.7	5.9
Fat (g)	1.7	1.3
Calcium (mg)	440	626
Iron (mg)	0.85	40
Vitamin C (mg)	615	110.2
β- carotene (μg)	6780	2400

Source: Gopalan, C., Ramasastri, B.V and Balasubhramaniam (2007). Nutritive value of Indian foods. NIN, Indian Council of Medical Research

Sensory evaluation:-

Sensory evaluation – A scientific discipline used to evoke, measure, analyze and interpret reactions to those characteristics of foods a material as they are perceived by the sense of sight, smell, taste, touch, and hearing. Sensory evaluation was done with help of 9 point hedonic rating scale in reference of appearance, taste, flavor, texture, color, by 9 panel members.

Nutrient Analysis:-

The moisture, protein, fat, calcium, β- carotene, vitamin C and iron of cookies were determined according to the standard AOAC methods.

Results and Discussion:-

The sensory and the nutritive value of cookies were represented in Table 2, Table 3. Moisture, fat, and protein were represented in g/100g. Calcium, iron, and vitamin C in mg/100g. And, β- carotene was represented in μg/100g.

Table 2:- Sensory Evaluation of cookies (as per 100gm)

Sample	Moisture (g)	Protein (g)	Fat (g)	Calcium (mg)	Vitamin C (mg)	Iron (mg)	β- carotene (μg)
M1	3.89	10.85	5.23	310	160	6.5	4842
M2	4.21	11.78	5.87	340	198	7.2	5102
M3	4.73	12.04	5.95	379	210	7.6	5326
B1	4.87	10.12	5.10	569	90	7.6	3862
B2	5.02	10.32	5.45	582	120	8,8	4265
B3	5.18	10.98	5.60	602	135	11.6	4465

Table 3:- Proximate analysis of cookies (as per 100gm)

Sample	Appearance	Color	Taste	Texture	Flavor	Overall acceptance
M1	6.5±0.65	6.6±0.51	6.6±0.52	6.2±0.43	6.9±0.73	6.5±0.51
M2	7.1±0.27	7.0±0.47	7.1±0.55	7.0±0.27	7.3±0.73	7.3±0.52
M3	7.7±0.36	7.6±0.5	7.7±0.38	7.6±0.5	7.7±0.47	8.0±0.36
B1	6.5±0.52	6.6±0.5	6.5±0.51	6.5±0.55	7.1±0.73	6.8±0.53
B2	7.3±0.50	7.5±0.51	7.6±0.43	7.5±0.52	7.6±0.47	7.7±0.47
B3	7.8±0.43	8.1±0.27	8.2±0.73	8.0±0.63	8.1±0.47	8.1±0.36

Data regarding the sensory evaluation of products revealed that all the products were acceptable at different levels of supplementation of drumstick leaf powder and cauliflower leaf powder. Moringa cookies and Brassica cookies were found to be highly acceptable at 35% level of supplementation of drumstick leaves powder and cauliflower leaves powder with an overall acceptable score of 7.35 to 8.05 respectively.

Nutritional analysis revealed that products supplemented with drumstick leaf powder had more protein, β -carotene and vitamin C content. However, the Vitamin C content of drumstick leaf powder was found as 615mg whereas cauliflower leaf powder as 110.2 mg/100g.

The Vitamin C content of final products of Moringa cookies is higher content than Brassica cookies, i.e., samples M3 (210mg/100g), M2 (198mg/ 100g) whereas Brassica cookies samples B3 (135mg/100g), B2 (120mg/100g). Maximum protein content was found in DLP samples which as 12.04g/100g for the sample M3 (45:55) and 11.78g/100g for M2 (55:45) whereas in Brassica cookies 0.98g/100g for the B3 (45:55) and 10.35g/100g for the B2 samples. The β -carotene content of drumstick leaf powder was found to be 6780 μ g whereas cauliflower leaf powder as 2400 μ g/100g. Moringa cookies samples are higher β -carotene content than Brassica cookies with a slight significant difference.

Maximum ascorbic acid and β -carotene content were found at the highest level of products supplemented with DLP. Calcium content of cauliflower leaf powder was found to be 626mg whereas drumstick leaf powder as 440mg/100g. Maximum calcium content was found in higher level of products supplemented with CLP as 602mg/100g for B3 (45:55) and 582mg/100g for B2 (55:45) whereas Moringa cookie samples have 379mg/100g for M3 (45:55) and 340mg/100g for M2 (55:45). And maximum iron content was found in CLP samples at 11.2mg/100g for the B3 sample and 8.8mg/100g for B2 sample, whereas DLP samples have 7.6mg/100g for M3 and 7.2mg/100g for the M2 samples.

Conclusion:-

Orally Moringa cookies, Brassica cookie samples M3, M2 and B3, B2 are a good source of protein, vitamin C, β -carotene, and calcium, iron. Apart from a comparison between Moringa cookies and Brassica cookies, Moringa cookies samples M2, M3 were a good source of protein, vitamin C, and β -carotene and Brassica cookies samples B2, B3 were a good source of calcium and iron.

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