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Formulation and Quality Evaluation of Dried Hibiscus Powder Incorporated Chocolate Cookies and Its Storage Stability

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Abstract

Aim: The study aims to develop dried hibiscus powder incorporated chocolate cookies and its quality evaluation. **Objectives:** To formulate and standardize dried hibiscus powder incorporated chocolate cookies, to analyze the nutrient content of dried hibiscus powder incorporated chocolate cookies, to evaluate the shelf life of the dried hibiscus powder incorporated chocolate cookies and to popularize the new product among adolescent girls. **Methods and Materials:** The chocolate cookie was prepared by incorporating dried hibiscus powder at various proportions like 5%, 10%, 15% and 20% with respect to samples A, B, C and D. Standard chocolate cookie was prepared without the addition of dried hibiscus powder. The formulated products were standardized and subjected to sensory evaluation to find the best proportion. The standard and selected products were analyzed for nutrient content and storage stability. Cost analysis and popularization were also done. **Result and Discussion:** Sample A with 5% dried hibiscus powder incorporated chocolate cookie had highest mean score in overall acceptability when compared to the other proportions, hence sample A was selected as a best product. Nutrients like iron and calcium were high in the selected product than standard. The standard and the best product were stored in airtight polythene bag and there was no change in sensory and microbial quality upto7 days. Popularization of the best product was done for a total of 30 participants and most of the adolescent girls accepted the product. The cost analysis showed that the selected product costs slightly higher than the standard. **Conclusion:** From the study it is concluded that, the dried hibiscus powder incorporated chocolate cookies was accepted organoleptically. The prepared product is high in iron and calcium when compared to the standard. The formulated product is accepted till 7th day with no microbial deterioration if it is stored in airtight polythene bags properly.

Keywords
Hibiscus powder, chocolate cookies

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INTRODUCTION

The new product development emphasizes the significance of presenting new products on the market for continuing business success. Its influence to the growth of the companies, its impact on profit performance, and its role as a key factor in business arrangement have been well known (Booz et al., 1982; Crawford, 1987; Urban and Hauser, 1993; Cooper, 2001; Ulrich and Eppinger, 2011).

In recent decades, nutritional science has clearly proved the significance of nutrition for health and general well-being. People have to consume enough foods with adequate nutritional quality and safety to meet all micro- and macronutrient necessities (Kraisid and Pattanee, 2009). Consumers are looking for variety in their diets and are conscious with the health benefits of food rich in micronutrients. Consistent intake of plant foods is connected with abundant health benefits rooted in their various physiological effects as a result of their phytochemical and nutritional constituents (Hunter and Fletcher, 2002).

Hibiscus sabdariffa, is found in many areas may have a notable nutritional potential (Morton *et al*., 2000).

Several plant species are recognized in folk medicine to have antidiabetic properties. Though, few plants have received proper scientific investigation. The genus *Hibiscus* is used empirically due to possible hypoglycemic or antidiabetic effects. For this purpose, many species of genus *Hibiscus* (Malvaceae) have gained the attention recent years (Damasceno and Volpato, 2008; Nayak et al., 2015; Ruban and Gajalakshmi, 2012).

Each newly formulated product should be standardized to maintain uniform taste, better quality and cost controls. The United States Department of Food and Agriculture defines a standardized recipe as one that has been tried, adopted and re-tried several times for use by a given food service operation and has been found to produce the same good results and yield, every time when the exact procedures are used with the same type of equipment and the same quantity and quality of ingredients (Meer, 2006).

Shelf life is that length of time that food items are given before they are considered unsuitable for sale or consumption. In some regions, a best before, use by or freshness date is required on packaged perishable foods. Shelf life is the recommendation time that products can be stored, during which the defined quality of a specified proportion of the foods remains acceptable under expected conditions of distribution, storage and display (Ropkins, 2006).

Keeping this above fact in outlook, the present study was carried out to exploit dried hibiscus powder by incorporating it in chocolate to develop a nutrient rich product with dried hibiscus powder.

With the above pretext, the present study was conducted, to formulate and standardize dried hibiscus powder incorporated chocolate cookies, to analyze the nutrient content, to evaluate the shelf life and to popularize the new product among adolescent girls

MATERIALS AND METHODS

Dried Hibiscus flower was available in the market. It was purchased and made into powder. The main ingredient in chocolate cookie was substituted with hibiscus powder at different levels of incorporation such as 5%, 10%, 15% and 20%. The standard product was prepared without hibiscus powder. Sensory evaluation was carried out to find the best proportion. A score card was prepared with the criteria appearance, color, flavor, texture and taste and was given to the panel members for the selection of most acceptable proportion. The sensory evaluation was done by 30 semi trained panel members from the Department of Foods and Nutrition in Rathnavel Subramaniam College of Arts and Science, Sulur, Coimbatore. The product that scored the highest in sensory analysis along with standard was taken for further study. Then the standard and selected best product was subjected to nutrient analysis in which iron and calcium were analyzed. The shelf life study was done by storing the standard and selected product in an air tight polythene bag and stored in room temperature and analyzed for a period of 1 week. The microbial analysis and sensory analysis were done for the sample as well as for the standard for every three days of interval. Spread plate technique was followed for microbial analysis. The cost estimation was done for the standard and selected product on the basis of ingredients used in the new product. It was done to compare the price of the standard product and the formulated product to find its economic feasibility. The popularization was done to create awareness among the adolescent girls about the beneficial effect of hibiscus powder incorporated cookies and their importance in improving their health.

RESULTS AND DISCUSSION

Sensory Analysis of Standard and Formulated Products

Sensory analysis of foods is the most vital quality assessment (Jonnalagadda *et al*., 2001). Sensory evaluation of standard and formulated chocolate cookies was done, and the mean scores obtained by the products are given below in Table 1.

Table 1: Comparison of Mean Scores for Standard and Selected Proportion of Hibiscus Powder Incorporated Chocolate Cookies

Products	Appearance Mean±SD	Color Mean ± SD	Texture Mean ± SD	Flavour Mean ± SD	Taste Mean ± SD
Standard	5±0	4.73±0.57	4.76±0.43	4.76 ±0.43	4.7±0.46
Sample A	4.83±0.37	4.6±0.62	4.6±0.66	4.66±0.53	4.56±0.61
Sample B	4.7±0.46	3.90±0.80	4.03±0.80	3.73±0.82	3.53±0.81
Sample C	3.7±0.83	3.10±0.89	3.1±0.73	3.43±0.85	2.96±0.85
Sample D	3.1±0.80	2.8±0.80	2.73±0.63	3.06±0.73	2.83±0.74

The above Table 1depict the mean sensory scores and it is clear that among the prepared products, Sample A with 5% dried hibiscus powder had the highest mean score in all the criteria when compared to other samples like sample B, C and D which were prepared with 10%, 15% and 20% dried hibiscus powder respectively. Hence, Sample A was chosen as the best product and subjected to further analysis.

Nutrient Analysis of Standard and the Selected Product

Table 2 shows the nutrient content of stand and selected product.

Table 2: Nutrient Analysis of Standard and the Selected Product

S.No	Nutrient	Standard Product (Per 100g)	Selected Product (Per 100g)
1	Iron (mg)	2.82	3.37
2	Calcium (mg)	75.9	79.5

From the above Table 2 it was observed that, the iron content is higher in the selected product (Sample A with 5% dried hibiscus powder) when compared to standard product and calcium content was also high in the selected product than standard product. The hibiscus powder incorporated chocolate cookies had highest amount of nutritive value compared to the standard.

Shelf Life Study of Standard and Selected Product

Shelf life study is another essential component of product development.

(i) Microbial Analysis of Standard and Selected Product

Microbial testing is done to find whether the pathogen is present or absent. The service includes total coli form count and aerobic plate counts. The total coli form count determines the number of coli form bacteria. High amount of coli form indicates the improper sanitation and processing. The details regarding the microbial load of standard and selected proportion of hibiscus powder incorporated chocolate cookies on storage is given Table 3.

Table 3: Microbial Load of the Standard Product and Selected Product Stored in Air Tight Polythene Bags

Name of the Product	Food Group	Indicator Test Result (CFU / gram) and Interpretation/ *Standard Plate Count*			
		G	M/S	US	PH
STANDARD AND SELECTED PRODUCT	Day 1 Day 4 Day 7		-	-	-
	Remark	On the 7th day after sampling no contamination was found.			
Organism identified	No Bacterial growth was observed				

G- Good, M/S - Marginally Satisfactory, US – Unsatisfactory and PH - Potentially Hazardous

Table 3 represents that, there was no microbial growth in both standard and sample immediately after preparation and on 4thdayand 7th day in air tight plastic bags. So, from the result we can conclude that the product is safe for consumption.

(ii) Sensory Analysis of Standard and Selected Product

The details regarding the mean sensory scores of standard and Hibiscus powder incorporated chocolate cookies on storage is given in Figure 1.

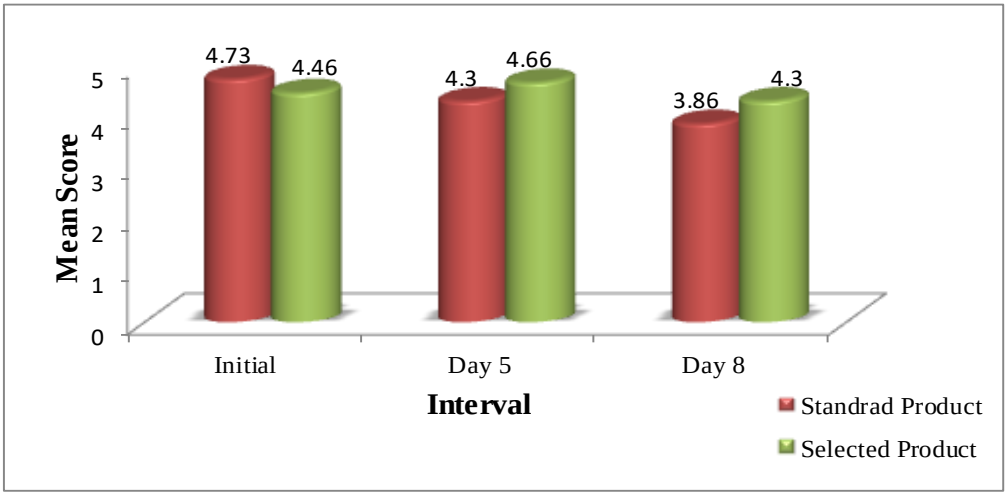

Figure 1: Mean Sensory Score for Standard and Selected Hibiscus Powder Incorporated Chocolate Cookies during Storage Study

Cost Analysis

The cost of 100g of standard and selected product were Rs.67/- and Rs.69/- respectively. This shows that, the cost of the sample is more than that of the standard. But when we compare the nutrient factor, sample has got much more nutritive value when compared to that of the standard. So, the slight change in the cost is negligible.

Popularization

From the results of the popularization it was found that, many of the subjects involved in the popularization study had understand the importance and health benefits of hibiscus flower and most of them were ready to buy the dried hibiscus powder incorporated product when it is available in the market.

CONCLUSION

From the study, it can be concluded that, the formulated hibiscus powder incorporated chocolate cookies have better nutrient content. It has the similar shelf life as that of the standard. There was no much variation in the cost.

BIBLIOGRAPHY

Booz, Allen, and Hamilton. (1982), *New product management for the 1980s*. New York: Booz, Allen and Hamilton, Inc.

Cooper, R. (2001), Winning at new products: Accelerating the process from idea to launch (3rd Ed.). Massachusetts: Perseus Publishing.

Crawford, C. (1987,1997), *New product management*. (2nd Ed. & 5th Ed.). Illinois: Richard D. Irwin.

Damasceno DC, Volpato GT (2008), Antidiabetic botanical extracts. In: Watson RR, Preedy VR editors. Botanical Medicine in Clinical Practice. CAB International, London;pp. 547-551.

Hunter, K.J. and J.M. Fletcher (2002), The antioxidant activity and composition of fresh, frozen, jarred and canned vegetable. Inn. Food Sci. Emerg. Technol.,3: 399-406.

Jonnalagadda, P.R., Bhatt, R.V., Sudershan, R.V., Naidu, A.N. (2001), Suitability of chemical parameters in setting quality standards for deep fried snacks, *Food Quality and Preference*, Vol: 12, Pp: 223-228.

Kraisid, T. and W. Pattanee (2009), The state of nutrition in the world in: Nutritional needs and quality diets. Creating shared value report 2008; Nestlé 2009.

Meer, (2006), Recent advances in human nutrition with special reference to clinical medicine, thirty fifth editions, *J and a Churchill Ltd.,* P: 56.

Morton, L.W., C.R. Abu-Amsha, I.B. Puddey and K.D.Croft, (2000), Chemistry and biological effects of dietary phenolic compounds: Relevance to cardio vascular diseases. Clin. Exp. Pharmacol. Physiol., 27: 152-159.

Nayak D, Ashe S, Rauta PR, Nayak B. (2015), Biosynthesis, characterization and antimicrobial activity of silver nanoparticles using *Hibiscus rosa-sinensis* petals extracts. IET Nanobiotechnol, 9: 288-293. pmid:26435282

Ropkins, J, (2006), "Hazard Analysis by Critical Control Point (HACCP), Department of Biological Sciences, Imperial College of Science, Technology and Medicine, University of London.

Ruban P, Gajalakshmi K. (2012), In vitro antibacterial activity of *Hibiscus rosa-sinensis* flower extract against human pathogens. Asian Pac J Trop Biomed. 2: 399-403. pmid:23569938

Ulrich, K.T. and Eppinger, S.D. (2011), Product Design and Development. McGraw-Hill.

Urban, C., and Hauser, J. (1993), Design and marketing of new products. New Jersey: Prentice-Hall.