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Studies on development of process technology for preparation of nutri white chocolate bar

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Abstract
Nutri white Chocolate Bar produces for the nutritional quality to improve or replace the morning & afternoon snakes as a complement to main meals. Nutri white Chocolate contain a multigrain premix was created using peanuts, soybeans, oats, and corn flakes. All ingredients are good source of micro nutrients. Dates highly soluble natural iron, calcium, potassium and other vitamins. Peanuts is rich source of edible oil, protein & nutrias contain vitamin E, niacin, calcium iron etc. about Garden cress seeds are good source of iron, calcium, protein used as the complementary food. Nutri white Chocolate prepared by mixing of all the ingredients with date, after mixing sheeting was done & cut to make a proper shape than molding with melted white chocolate to make a proper Nutri white Chocolate. Proximate analysis of Nutri white Chocolate that moisture content (7.88 ±0.03%), Fat (22.83 ±0.01%), Ash (2.48 ±0.01%), Carbohydrate (69.48±0.02%), Protein (9.84 ±0.01%) and Energy (522.75±0.04kcal) respectively. Nutri white Chocolate prepared recorded highest sensory score in all quality attributes and good storage satabillity. It concluded that the Nutri Bar can be stored for 60 Days at refrigeration and room Temperature. So the Nutri Bar can be satisfy the consumer in accepts & Quality.

Keywords: White chocolate bar, peanut, soybean, oat, corn flakes, dates sensory evaluation, proximate analysis, storage study

Introduction

Bars have gained popularity as convenient snacks with high nutritional content, providing a balance of carbohydrates, proteins, lipids, and minerals. However, commonly available snack options like potato chips and chocolate bars lack nutritional value and are considered unhealthy, particularly for school-going children. To address this gap, there is a need to develop cost-effective, nutritious snack options using dried fruits, processed legumes, cereals, and nuts, which are more accessible and affordable, especially for low and middle-income families. The focus should be on utilizing underutilized food sources with robust nutritional profiles to create affordable, wholesome products for the target market 22.9% of children globally under the age of five experienced stunted growth, with undernutrition accounting for approximately 50% of deaths in this age group, totaling 3 million young lives lost annually. Additionally, 52 million children under five were wasted, including 17 million who were severely wasted, signifying prevalence rates of 7.7% and 2.5%, respectively. Meeting the protein needs of this vulnerable population is crucial, and the demand for high-protein nutrition (HPN) bars has risen, offering a convenient and desirable solution for children's diets (Arvind kumae et. al, 2018) [1]

Peanuts, a vital oilseed crop in India, contribute significantly to global production, serving both as a source of edible oil (43-55%) and protein (25-28%). The kernel's color variations, ranging from red to brown-purple, are influenced by genetic factors and tannins, with the testa accounting for 4-5% of the kernel weight. (S. Balasubramanian et. al, 2011) [13]. Peanuts provide 567 Kcal energy (29% RDA), 16.13 g carbs (12% RDA), 25.80 g protein (46% RDA), 49.24 g fat (165% RDA), and 8.5 g fiber (22% RDA). They also contain various vitamins and minerals: 240 µg folates (60% RDA), 12.066 mg niacin (75% RDA), 1.767 mg pantothenic acid (35% RDA), and 0.348 mg pyridoxine (27% RDA), along with essential minerals such as 92 mg calcium (9% RDA), 1.144 mg copper (127% RDA), 4.58 mg iron (57% RDA), and 168 mg magnesium (42% RDA). Arya S. Set. al. (2015) [4]

Soybean, originating in East Asia 5,000 years ago, holds historical significance and diverse applications. Black soybeans, comprising 2% of global production, possess distinct characteristics due to their rich polyphenol content and antioxidant properties. This research explores the physicochemical attributes of black soybeans, emphasizing their unique composition and properties. (Sumangala S & Uma N Kulkarni, 2019) [11]. Per 100 grams, soybean contains 884 kilocalories of energy, 0.02 milligrams of iron, 8.18 milligrams of Vitamin E (alpha tocopherol), and 183.9 micrograms of Vitamin K (phylloquinone). It also has 15.251 grams of saturated fatty acids (SFA), 22.727 grams of mono-unsaturated fatty acids (MUFA), and 57.333 grams of poly-unsaturated fatty acids (PUFA). Akshay Talukdar & M. Shivakumar (2016) [3].

Oats, commonly known as Avena sativa L., are a significant cereal crop predominantly grown in countries like Russia, Canada, and the United States of America. Initially used for animal feed, oats have gained popularity as a health food due to their high nutritional value, including β-glucans, antioxidant vitamin E, phytic acid, and phenolic compounds. Rich in protein, unsaturated fatty acids, vitamins, and minerals, oats are recognized for their valuable β-glucans, arabinoxylans, and cellulose content Sayad SJ, (2020). Whole grain oats typically contain 15%-17% protein, 59%-70% starches and sugars, approximately 4.5% fat, around 12% total dietary fiber, 2%-6% ß-Glucan, 14% cellulose, and roughly 2.4% lignin. On the other hand, oat bran comprises 15%-18% protein, 10%-50% starches and sugars, approximately 6.5% fat, 14%-15% total dietary

fiber, 5%-20% ß-Glucan, around 2.5% cellulose, and approximately 4.5% lignin. Preeti Khann, Sumit Mohan, (2017) [10].

White chocolate is made by mixing cocoa butter, milk powder, sugar and lecithin. Due to the absence of cocoa mass, white chocolate has significantly lower polyphenol content and antioxidant activity compared to milk and dark chocolate and thus is often considered as unhealthy food by consumer. In the context of product stability, the lack of antioxidant compounds in white chocolate induce the rapid development of brown colour as a result of non-enzymatic browning reaction and oxidation process which limits the shelf-life of white chocolate Dimas rahadian et. al. (2020). The nutritional composition of white chocolate water activity of 0.345 ± 0.0032, moisture content of 1.77 ± 0.008 per cent, protein content of 11.58 ± 0.36 per cent, fat content of 32.24 ± 0.18 per cent, total sugar content of 51.03 ± 1.5 per cent, acidity of 0.42 ± 0.02 per cent lactic acid, and ash content of 1.76 ± 0.04 per cent. Singh Manpreet, et. al. (2017).

Materials and Methods

Ingredients, Chemical and Equipments

Raw materials required during present investigation were procured from local market of Saralgaon such as peanuts, soybeans, oats, corn flakes, dates, and white chocolate etc. Most of the chemicals and equipments used in this investigation were of analytical grade which are obtained from College of Food Technology Saralgaon, Thane.

Physical and Chemical Analysis

In the chemical analysis process, moisture content is evaluated through the application of a hot air oven, while fat content is determined using the Soxhlet apparatus. Protein levels are ascertained through the Kjeldahl's method. Acidity values are obtained through titration, and pH measurements are acquired with the aid of a digital pH meter. All the quality parameters were assessed following the guidelines specified in the AOAC (2000).

Organoleptic Evaluation

The sensory evaluation of the prepared product was conducted, focusing on aspects such as appearance, color, flavor, aftertaste, texture, and overall acceptability. A group of 10 semi-trained panel members, consisting of academic staff, utilized a 9-point Hedonic scale to rate the product. Ratings ranged from 'like extremely' (9) to 'dislike extremely' (1). The results were documented in a sensory scorecard.

Statistical Analysis

The data was analyzed using a Completely Randomized Design (CRD) with different treatments, following the method outlined by Panse and Sukhatme in 1967. The analysis of variance showed significance at a p-value less than 0.005. Standard error (S.E.) and Critical Difference (C.D.) at the 5 percent level have been reported when necessary.

Formulation of Nutri White Chocolate Bar from Peanut, Soybean, Oats, Corn Flakes, Dates, White Chocolate

The formulation of Bar was made by varying levels of Soybean, Peanut, Oats, Corn Flakes, Dates, White Chocolate *viz.*,05g:10g:15g:20g:10g:40, 20g:15g:05g:10g:10g:40g, and 10g:20g:10g:10g:10g:40g percent respectively and data given

Where**,**

T1 - Soybean (5 g) + Peanut (10 g) + Oats (15 g) + Corn flakes (20 g)

T2 - Soybean (20 g) + Peanut (15 g) + Oats (5 g) + Corn flakes (10 g)

T3 - Soybean (10 g) + Peanut (20 g) + Oats (10 g) + Corn flakes (10 g)

Dates & white Chocolate were used at 20g & 40g in each formulation of White Chocolate Bar

Preparation of Nutri White Chocolate Bar

Raw materials such as soybean, peanut, Oats, Corn flakes are used for bar preparation. All ingredient roast at 60°C for 5-10min then grind to make fine powder and Peanuts are braked into fine pieces stored in air tight container.

Flow sheet 1: Preparation of Nutri White Chocolate Bar

Mixing of ingredients
↓
Addition of dates
↓
Uniform mixing
↓
Preparation of uniform bar
↓
Chocolate
↓
Molding ←Melting
↓
Grinding
↓
Setting bar
↓
Refrigeration
↓
Packaging
↓
Storage

Results and Discussion

Table 1: Physical Properties of Nutri white chocolate Bar

Sr. No.	Physical Properties	Selected sample
1.	Colour	White
2.	Length	7.4 cm
3.	Breadth	2.6 cm
4.	Width	1.1 cm
5.	Weight	20 gm

The Physical Properties of Bar shows Colour white due to using of White Chocolate observed by visual observation. Length, breadth and width 7.4cm, 2.6cm, 1.1cm measured by vernier calliper. Weight 20gm measured by digital weighting balance.

Table 2: Chemical Properties of Nutri white chocolate Bar

Chemical Parameter	Selected sample {as per 100 gm}
Ash	2.48 ±0.01%
Moisture	7.88 ±0.03%
Fat	22.83 ±0.01%
Protein	9.84 ±0.01%
Carbohydrates	69.48±0.02%
Energy Value	522.75±0.04kcal

The chemical properties of Nutri white chocolate Bar shows moisture content (7.88 ±0.03%), Fat (22.83 ±0.01%), Ash (2.48 ±0.01%), Carbohydrate (69.48±0.02%), Protein (9.84 ±0.01%) and Energy (522.75±0.04kcal). All the calculated and observed results Similar to that (Mridula et. al., 2011, Kokani et. al., 2018, Farajzadeh and Golmakani 2011 and Nadeem et. al., 2014).

Sensory Evaluation of Nutri white chocolate Bar

In this evaluation sample T3 is more acceptable than sample T1 and T2 because sample T3 gives better taste as compared to sample T1 and T2 which gives excessive. Sample T3 gives better texture than T1 and T2. The sensory score given for selected sample T3 by panel members was Colour (9), Flavour (9), Taste (9), Texture (9) and Appearance (9).

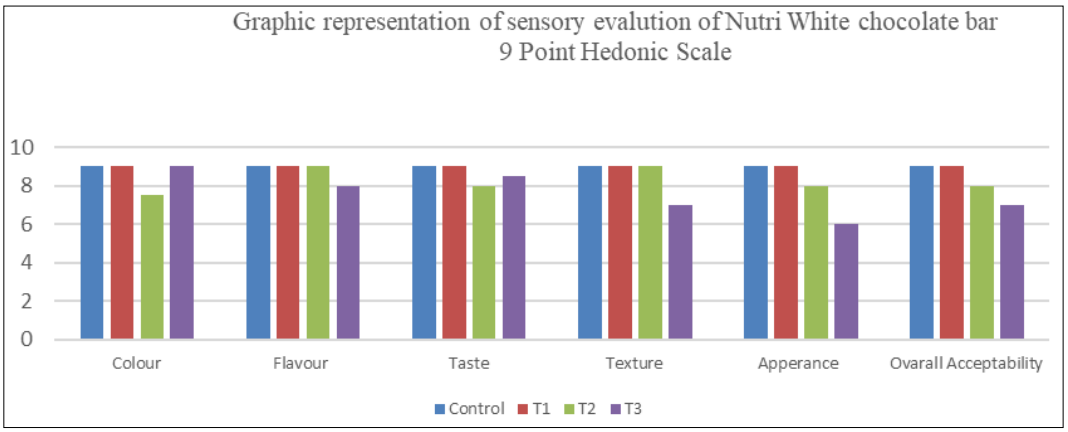

Fig 1: Graphical Representation

Conclusion

It can be conclude that white chocolate bar made with soybean, peanuts, oats, corn, flakes, dates and also addition of Nutri white chocolate can be improve the nutritional value of Bar and was found acceptable by the panel member. White chocolate bar packed in aluminium foil was found steel and acceptable up to two month of storage.

References

1. Arvind kumar, Vedshree Mohanty, P Yashaswini. Development of High Protein Nutritional Bar Enriched with Spirulina Plantation for Undernourished Children. Current Research in Nutritional and Food Science, 2018.
2. Anupam Saha1 A, Suprodip Mandal. Nutritional Benefit of Soybean and Its Advancement in Research. Sustainable Food Production, 2019.
3. Akshay Talukdar*, M Shivakumar. Genetic improvement of food-grade soybean in India: Current status and future prospects. Indian J. Genet, 2016.
4. Arya SS1*, Chauhan S2, Salve A1. Peanuts as functional food: a review, 2015.
5. Christopher J Etti1, Linus Ashiwel Adie2. Effects of Pretreatments and Drying Methods on Some Anti-nutrients and Proximate Composition of Peanut (Arachis Hypogaea). International Research Journal of Engineering and Technology (IRJET), 2022.
6. Chandan Solanki*, Mridula D, RK Gupta. Evaluation of physical properties of oat grain (avena sativa). Chemical Science Review and Letter, 2019.
7. Harmeen Kaur, Navjot Kaur. Effect of Germination on the Nutritional and Anti-Nutritional Composition of Soy Bean (Glycine max). International Journal of Current Microbiology and Applied Sciences, 2019.
8. Nadeem M, Hussain S, Din A. Development and Evaluation of Nutri-Bars for Internally Displaced People in Humanitarian Emergencies. J. Agic.Res, 2014, 52(2).
9. Payal Bansal, Anita Kochhar. Development of Peanut Flour Based Value Added Products for Malnourished Children. International Journal of Medical Scienc, 2013, 59-64.
10. Preeti Khanna, 2 Sumit Mohan. Oats: Understanding the science. International Journal of Food Science and Nutrition, 2017.
11. Sumangala S, Uma N Kulkarni. Physico - chemical properties of black and yellow soybean (Glycine max L.) Genotype. The Pharma Innovation Journal,2019:8(7):33-37.
12. Sachin Vilas Wandkar*1, Pravin Dhangopal Ukey2, Dilip Ananda Pawar1. Determination of physical properties of soybean at different moisture levels, 2019.
13. S Balasubramanian1, R Sharma1, V Sardana2. Studies on Some Engineering Properties of Peanut Pod and Kernel. Journal of Agricultural Engineering, 2011, 48(2).
14. Spurthi N Nayak1*, Viresh Hebbal1, Pushpa Bharati2, Hajisab L Nadaf3, Gopalkrishna K Naidu3, Ramesh S Bhat1. Profiling of Nutraceuticals and Proximates in Peanut Genotypes Differing for Seed Coat Color and Seed Size. Frontiers in Nutrition, 2020.

15. Syed SJ, Gadhe KS, Katke SD. Studies on physical, chemical and mineral evaluation of oats (Avena sativa). Journal of Pharmacognosy and Phytochemistry, 2020.
16. Preeti Khanna, 2 Sumit Mohan. Oats: Understanding the science. International Journal of Food Science and Nutrition, 2017.