



Formulation and Standardization of Nutritious Chocolates

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Abstract:

Chocolate is popular and favorite by all people. Chocolate contains a high level of antioxidants. Chocolate could lower cholesterol levels and prevent memory & good for heart, brain and a good mood food it can be useful in stress some time used to maintain weight should eat in moderate amount. it increases skin density and hydration dark chocolate contain polyphenols, a powerful type of antioxidant present in them so it helps to defend free radical from the body cells against free radicals from heart disease, cancer, and chronic inflammation our study on the chocolate base used in the preparation of nutritious chocolate formulated with wheat germ powder, ragi powder & flax seed powder. From the judge's score, the most preferred chocolate was ragi chocolate Almost all the chocolate are more or less got the same score the difference in the mean score is not very high. From a nutritional point of view, wheat germ chocolate is rich in protein and calcium. Ragi chocolate is rich in iron and calcium And the flax seed chocolate are rich in omega3 and omega-6 fatty acid & more calories than normal chocolate so nutritious chocolate is highly acceptable by all selected judges. From our college staff.

Keywords: Nutritional Chocolate properties, Formulated chocolate, Health benefits

Introduction:

Chocolate is the most popular and favorite of all vulnerable in the world. Everyone like chocolates irrespective of their age, from childhood to old age. Chocolate is typically sweet, usually brown food preparation of Theobroma cocoa seed, roasted and ground. Chocolate has become one of the most popular food types and flavors in the world, and a vast number of foodstuffs involving chocolate have been created, particularly desserts including cakes, pudding, chocolate chip cookies, etc. The health effects Chocolate of chocolate are the possible positive and negative effects the health eating chocolate. Chocolate has long been associated with conditions such as diabetes,

coronary heart disease, and hypertension. Chocolate is high content of antioxidants. Chocolate contains a large number of calories.

Health benefits of chocolate by K. Harith, et al are reported that the nutrient composition of chocolate are helpful to prevent cardiovascular diseases as well as the Type-2 diabetes

Roberta Tolve, et al 2016, these authors have conducted an experiment in which they fortified the chocolate with the microencapsulated phytosterols (MP) to reduce cholesterol in the individual. The sensory evaluation demonstrated a positive effect on the acceptability of the functional chocolate, resulting in a stable cholesterol-reducing product.

Incorporated ingredients in new products:

Flaxseed, or Linseed (*Linum Usitatissimum*), is popularly known as Alsi, Jawas, in Indian languages, (Anonymous, 2000). Flax (*Linum usitassimum*) belonging to the family Linaceae, is a blue flowering annual herb that produces small flat seeds varying from golden yellow to reddish-brown color. Flaxseed possesses a crispy texture and nutty taste (Morris 2007; Rubilar et al., 2010). The whole flaxseed is flat and oval with pointed tips, varies in color from dark to yellow, and measures approximately $2.5 \times 5.0 \times 1.5$ mm (Freeman, 1995). Flaxseed continues to surge forward in its recognition as a functional food, being rich in the essential omega-3 fatty acid, alpha-linolenic acid, and many phytochemicals. Flaxseed also provides dietary fiber and protein (flax primer) and was singled out as one of six nutraceuticals (Oomah 1995).

Composition:

Flaxseed is rich in fat, protein, and dietary fiber. The composition of flaxseed can vary with genetics, growing environment, and method of seed processing (Daun et al., 2003) An analysis of brown flaxseed averaged 41% fat, 20% protein, 28% total dietary fiber, 7.7% moisture, and 3.4% ash (Anonymous, 2001). It is well known that flax seeds are a source of a high content of polyunsaturated fatty acids (Pradhan et al., 2010).

Nutritional content Among the functional foods:

flaxseed has emerged as potential functional food and is a good source of alpha-linolenic acid, lignans, high-quality protein, soluble fiber, and phenolic compounds (Oomah, 2001). Flaxseed as functional food Flaxseed is considered a functional food owing to the presence of three main bioactive components—alpha-linolenic acid, lignans, and dietary fiber. Alpha-linolenic acid

Alpha-linolenic acid is the main functional component of flaxseed. It serves as an exclusive source of omega-3 fatty acids in vegetarian diets (Riediger et al., 2009). Fatty acids are termed essential because they are required by the body but the body cannot synthesize them, therefore need to be supplied in the diet. The human body lacks the enzymes which are required for the synthesis of these essential fatty acids (de Lorgeril et al., 2001). These two polyunsaturated fatty acids are essential for humans – that is, the body needs them. Supercritical CO₂ extraction gave a higher average ALA content (60.5%) compared to the Soxhlet extraction method (56.7%) (Bozan and Temelli, 2002). Alpha Linolic acid from flaxseed exerts a positive effect on blood lipids. It was found to be as

effective as oleic acid (18:2h-6) and linoleic acid (18:2h-6) in the reduction of plasma total cholesterol, low-density lipoprotein cholesterol, and very-low-density lipoprotein cholesterol in 20-34 years old healthy men (Chan et al., 1993).

Health Benefits of Flaxseed:

Anti-oxidant functions: The antioxidant activity of the flaxseed has been shown to reduce total cholesterol as well as platelet aggregation (Allman et al., 1995).

Ragi:

Ragi is scientifically called Eleusine coracana. The common English name of Ragi is finger millet, Ragi in Hindi, Nachni in Marathi, is an annually cultivated cereal crop, vastly found in the tropical regions of India. The seeds of the ragi plant are dried, cleaned, and stored as grains. Ragi confers valuable health benefits such as enhancing digestion, reducing the risk of heart disease, slowing down aging, and managing diabetes

Nutritional Content of Ragi:

Ragi contains all the essential macronutrients like carbohydrates, fibers, fats, and proteins along with micronutrients like vitamins and minerals it had a negligible amount of cholesterol and sodium to promote heart wellness In addition ragi contain considerable quantities of vitamins & E to boost immunity. The B complex vitamins - thiamine, riboflavin, niacin, and folic acid as well as calcium, magnesium, iron, and phosphorus

Ragi is completely devoid of cholesterol and sodium, so recipes made with ragi flour can safely be consumed by those with heart ailments. Furthermore, the abundance of dietary fibers and vitamins B3 or niacin helps to enhance food HDL levels and diminish bad LDL levels. This averts plaque and fatty deposits in heart vessels, easing cardiac muscle function and improving heart health

Ragi for pregnant and lactation women

Sprouting some ragi grains overnight and consuming them the next morning has massive benefits for the health of pregnant and lactating women. Due to the immense iron and calcium content in ragi, it is ideal to stimulate milk production and balance hormonal activities in expecting women and young mothers

Method of research: The experiment was conducted in the Department of Food Science in our college. 10 Panel members were selected from our college lecture staff total duration of research work was 15 days for sensory evaluation of products.

Hedonics scale:

These tests describe the liking or acceptability of a product. Questions may be of the type Do you like this product? “How much do you like this product on a scale of 1 to 10, where 1 = dislike product on a scale of 1 to 10, where 1 = dislike extremely, and 10 = like extremely? , Is product A better than product B?

This type of scorecard was prepared for the evaluation of products

Preparation of chocolate recipes:

Three types of chocolate recipes were selected and formulated these recipes and standardized with innovative ideas with adding new food items and different innovative ways of preparation and different names also given as suitable for chocolate products.

Various recipes of chocolate preparation from video of khana khajana by Sanjeev Kapoor, and madoolika recopies for preparation and standardization of chocolate recipes. Three different food sample was selected for the preparation of chocolate recipes like wheat germ powder, Ragi millets powder, & Flax seed powder. Because these are familiar foodstuff to all Indian people

Preparation of innovative nutritious chocolate recopies:**Preparation of What germ powder:**

Wheat germ powder was prepared by soaking whole wheat in water for 12 hours

It was kept for germination for 48 hours. Then germinated wheat was sundried for two days then dry germinated wheat was roasted in the iron pot at low flame till it become golden brown color developed the roasted wheat germ was ground through a mixer for prepared fine powder. Ground wheat germ powder is sieved through a strainer and kept in an airtight container for further chocolate preparation recipes.

Preparation of Ragi powder:

Whole Ragi seeds were roasted in iron utensil at low flame till they become crunchy (lahi) puffy light brown texture after cooking their grind with a mixer for preparing fine powder. Ragi flour was sieved through a strainer and kept in an airtight container to the used chocolate product.

Preparation of flaxseed powder:

A light hot iron pan (kadhai) was used for roasting flax seed for roasting properly to develop a crunchy texture .then the seed was properly cooled then grind through a mixer for preparing fine powder then kept in an airtight container for further use of the prepared product

Formulation of Preparation of Nutritious Chocolate:

Sr. No.	Ingredients	Amounts (gm)
1	Dark chocolate	120
2	Milk powder	15
3	Wheat germ powder	35

4	Ragi Powder	35
5	Flaxseed powder	35

Preparation method of nutritious chocolate:

Firstly as per the given ingredient amount 125gm dark chocolate base melt by stem procedure method like one-pot contain water to put in gas flame then put next pot it into to melting chocolate base ingredient. Then add 35 gm wheat germ powder, and 15 gm milk powder added to it mix well for about 7 to 10 minutes to make a smooth batter then take this batter into the chocolate mold then put freeze it for about 15 to 20 minutes. Then take out the chocolates from the mold and cover the pack with silver foil & attractive raping paper.

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Selection of panel of Judges:

The proforma for sensory evaluation of nutritious chocolates was prepared by using a hedonic scale for the proper evaluation of recipes. The judges from Arts, Science, and Commerce College Chikhaldara were selected as judges for the sensory evaluation of innovative nutritious chocolate recipes.

Standardization of Recipes:

For the tasty, delicious, and nutritious recipes for standardization of innovative chocolate recipes was done in the laboratory. The different types of chocolate recipes are prepared, in a food science laboratory. The recipes are prepared by adding innovative ideas for preparing traditional ingredients to develop new nutritious chocolate products.

Method of sensory evaluation of Nutritious chocolate recipes:

Sensory evaluation: Scientific measurement method of food quality based on sensory characteristics as perceived by five senses

Three types of nutritious chocolate products were prepared for an experiment to evaluate by a panel of judges. The proform based on a hedonic scale was provided to the 10 judges. The attributes for sensory evaluation were selected like color, texture, taste, flavor appearance, and acceptability. For evaluation of the result mean and standard deviation formula was applied.

Result:

Judges selected their ages between 41 to 50. Distribution of respondent judges according to like and dislike for new formulated chocolate 90% of respondent judges were like new formulated chocolate. 10% of respondents judged was dislike new formulated chocolate.

Table 1: Overall Acceptability of the new chocolate by judges:

Sr. No.	Judges	Sample A	Sample B	Sample C
1	Judge 1	13	14	14
2	Judge 2	14	12	14
3	Judge 3	14	16	14
4	Judge 4	16	14	12
5	Judge 5	14	16	12
6	Judge 6	12	12	15
7	Judge 7	12	14	14
8	Judge 8	13	14	13
9	Judge 9	14	14	12
10	Judge 10	13	12	10
Total	10	135	138	130
Mean Score		13.5	13.8	13.0
S. D.		1.18	1.48	1.49

Note: Sample A: Wheat germ powder, Sample B: Ragi powder, Sample C: Flaxseed powder

S. D.: Standard Deviation

Table no 1 determines that the mean score of the wheat germ powder chocolate was 13.5, obtain by test acceptability appearance and the mean score of ragi chocolate was 13.8. by taste acceptability and appearance and the mean score of flax seed chocolate was 13.0 obtain by taste acceptability and appearance it was conducted that the highest mean score obtain from ragi chocolate.

Table 2:Nutritive value of new formulated chocolate (per 100 g):

S. N.	Types of Chocolate	Energy Kcal	Protein Gm	Carbohydrates gm	Fat gm	Calcium mg	Omega-3	Omega-6
1	Normal dark chocolate	700	04	70	40.3	-	-	-
2	Wheat germ powder	902	19.44	124	44	232	-	-
3	Ragi powder	887	12.8	131	42.55	33.84	-	-
4	Flaxseed Chocolate	936	17.0	88	54	219	0.68	0.18

Conclusion: As per the result analysis all three types of new formulated chocolate are slight differences in all attributes as compared to normal chocolate. All experimental chocolate is rich nutritional value than normal chocolate. The chocolate was being done for different reasons to increase all over nutrient concentration

Reference:

1. Allman MA, Pena MM, Pang D.: Supplementation with flaxseed oil versus sunflower seed oil in healthy young men consuming a low-fat diet: effects on platelet composition and function. *Eur J Clin Nutr.*, 49: 169-178 (1995).
2. Anonymous: Oil world statistics update. In: *Oil World*, 31. p. 9–10(2000).
3. Chan, JK, McDonald, BE, Gerrard, JM, Bruce, VM, Weaver, BJ, Holub, BJ.: Effect of dietary alpha-linolenic acid and its ratio to linoleic acid on platelet and plasma fatty acids and thrombogenesis. *Lipids.*, 28: 811–817 (1993).
4. de Lorgeril M, Salen P, Laporte F, de Leiris J.: Alpha-linolenic acid in the prevention and treatment of coronary heart disease. *Eur Heart J Suppl.*, D3: 26–32 (2001).
5. .Daun JK, Barthet VJ, Chornick TL, Duguid S.: Structure, Composition, and Variety Development of Flaxseed. *Flaxseed in Human Nutrition(2ndEdn)*, AOCS Press, USA, p. 1-40 (2003).

6. K. Haritha, L. Kalyani And A. Lakshmana Rao (2014); Health Benefits Of Chocolate
7. Morris DH.: Flax Primer, A Health and Nutrition Primer. Flax Council of Canada., p. 9-19 (2007).
8. Oomah BD, Kenaschuk EO, Mazza G.: Phenolic acids in flaxseed. J Agric Food Chem., 2016-2019 (1995).
9. Pradhan R, Meda V, Rout P, Naik S.: Supercritical CO₂ extraction processes. J Food Eng., 98: 393-397 (2010).
10. Riediger ND, Othman R, Fitz E, Pierce GN, Suh M, Moghadasian MH.: Low n₆:n₃ fatty acid ratio, with fish or flaxseed oil, in the high-fat diet improves plasma lipids and beneficially alters tissue fatty acid composition in mice. Eur J Nutr., 47: 153–160 (2009).
11. Roberta Tolve, Nicola Condelli, Marisa Carmela Caruso, Diego Barletta, Fabio Favati, And Fernanda Galgano (2016); Fortification Of Dark Chocolate With Microencapsulated Phytosterols: Chemical And Sensory Evaluation.
12. RubilarM, Gutiérrez C, Verdugo M, Shene C, Sineiro J.: Flaxseed as a source of functional ingredients. J Soil Sci Plant Nutr., 10: 373–377 (2010).
13. Smith G. Nkhata, Emmanuel Ayua, Elijah H. Kamau, Jean-Bosco Shingiro **Fermentation and germination improve the nutritional value of cereals and legumes through activation of endogenous enzymes** J.Food & Nutrition First published: 16 October (2018).

