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Studies on Development of Process Technology for Preparation of Dry Fruit Balls Incorporated with Flaxseeds

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Abstract: ***The aim is to prepare Balls (laddu) as a nutritional point of view and to provide convenience to the consumer. The ingredient which was used for preparation of balls is Dates (Phoenix dactylitera) which contains Energy: 282 cal, Protein: 2.5 g. Carbohydrates: 75 g, Fat: 0.4 g etc. Vitamin B-6 (PYRIDOXINE) is present. Minerals such as Calcium, iron, Magnesium ate present in Dates. The flax seeds are very important in regular diet for humans especially for females. They increase nutrient absorption, help in weight loss, gluten free, rich in antioxidants and omega 3 fatty acids. Owing to these health benefits, dietitians and doctors advise to take flax seeds every day. Balls (ladoo) are good and typically made fromvarious flours and dry fruits by various ways. Balls Ladoo) are usually round, sweet, small or large in size. For preparation of Balls (ladoo) ingredients used are pitted dates, flax seeds, almonds, cashews, Jaggery syrup, cats etc. all these ingredients were finely grounded. The formulation was made by varying levels of ingredients, For preparation of Balls (ladoo) all ingredients were roasted and then grounded into fine powder. The dates were pitted and then grounded in mixer grinder. All these grounded ingredients weremade into dough by adding Jaggery syrup. Three trials have been done T1, T2, and Ta by varying proportion of all ingredients and T3 has been selected. Proximate composition of ladoo ware fat contentwas found out to be 7.08 ± 0.02%, the protein content is 7.85± 0.09%, the total carbs are 58.40 0.07%, the energy in ladoo was 328.72 kcal and ash content is about 2.01 1 0.11% respectively). It was concluded that the Balls (ladoo) can be store for one month in High density polyethylene pouches at room temperature. These balls are rich source of iron so they satisfy consumer's needs. Keywords: Convenience; Health benefits; Proximate composition; Store.***

I. INTRODUCTION

Ladoo are ball shaped sweet popular in Indian's subcontinent. They are made up of different flours, sugar with added ingredients. This traditional Indian dessert is made with different types of flour that are mixed with sugar and shortening, then shaped into balls. Like many other dishes in India, laddu appears in numerous varieties and is created with a myriad of different ingredients. Tiny laddu balls canbe made with various types of legume flour, most commonly chickpea flour, wheat flour, and even coconut flakes. Dried fruits or nuts are often incorporated to provide sweetness and modify the flavor. This old Indian confectionery was primarily created with flour and Jaggery. The food product i.e. Ladoo developed from maize of high-quality protein due to having balanced amino. acids compositions commonly known as Quality Protein Maize in combination with Ragi, green gram, gingelly seeds, amaranths and Jaggery was analyzed for nutritional composition and tested for common acceptability. Iron and Calcium content was 13.23 mg/100 gms and 418.03 mg/100 gms, respectively, Acceptability score of food product was evaluated by 30 pregnant women by using 9-point hedonic scale. The score for different parameters such as colour, flavour, texture, taste and general acceptability were recorded. Score for all parameters was above 6 which indicated the acceptance of product. The product made was Nutritious Ladoos which was mainly a galactagogue, made with the following ingredients dried dates, Garden cress seeds, dry coconut, Jaggery, Dink, Ghee. A galactagogue is generally given to a lactating woman which helps increasing the breast milk production. Ladoo is rich in fibre and Corresponding author: Kokani Ranjeet Chunilal, Department of Food Technology, Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India, E-mail: kokanirc.mitcft@gmail.com

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Copyright: 2021 Chunilal KR, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction inany medium, provided the original author and source are credited other nutrients like calcium, phosphorus, iron, carotene, niacin and essential amino acid [1].

Flaxseeds are scientifically known as Linumusitatissimum and Latinusitatissimum means 'most useful'. Itis a multi-farious crop and is grown either for the production of oil or fibre. Flaxseed is also known as linseed and is thought to be one of the oldest cultivated crops with evidence of cultivation dating back thousands of years (Newkirk, 2008). Consumers are returning back to its use due to its multifarious health benefits. Flax is nature's miraculous plant and cures our heart, blood, joints, colon, ageing, brain and even peace of mind. Also known as common flax or linseed is a member of the genus Lirum in the family Linaceae [2]. It is a food and fibre crop cultivated in cooler regions of the world. Flaxseed containshigh levels of protein, dietary fibre, several B vitamins, and dietary minerals. Flaxseeds are especially richin thiamine, magnesium, potassium, and phosphorus (DVs above 90%). Flax contains hundreds of times more lignans than other plant foods. As a percentage of total fat, flaxseeds contain 54% omega-3 fatty acids (mostly ALA), 18% omega-9 fatty acids (oleic acid), and 6% omega-6 fatty acids (linoleic acid); the seeds contain 9% saturated fat, including 5% as palmitic acid, Flaxseed oil contains 53% 18:3 omega-3 fatty acids (mostly ALA) and 13% 18:2 omega-6 fatty acids. Almonds are a nutrient dense food, and extensive research during the last decade on the potential health benefits of almonds has linked consumption patterns to reduced risk of chronic diseases such ascoronary heart disease. Almonds are 4% water, 22% carbohydrates, 21% protein, and 50% tat. In a 100-gram reference amount, almonds supply 2,420 kilojoules (579 kilocalories) of food energy. The almond is a nutritionally dense food, providing a rich source (20% or more of the Daily Value, DV) of the B vitamins riboflavin and niacin, vitamin E, and the essential minerals calcium, copper, iron, magnesium, manganese, phosphorus, and zinc. Oats are unique among the cereals; one of the rich sources of dietary fibres among cereals belongs to the Poaceae family like all other grain varieties. Oats are generally considered-healthy", being touted commercially as nutritious which has led to wider appreciation of oats as human food, Oat grout or whole grains (after removal of hull) contain all three parts of the grain the germ, endosperm and bran, rich in all valuable nutrients. A high intake of dietary fibre is positively related to several preventive medical and nutritional effects e.g. Dietary fibre complex with its antioxidants and other phytochemicals is most effective against cardiovascular disease and some types of cancer, lowering lipid levels. Date palm (Phoenix dactylifera L.) is widely grown in the hot arid regions mainly in the Middle East and North Africa, and provides nutrition, as a staple food for centuries, food security, and raw material to the food industry. Date fruit is a rich source of sugar, nutrients and pharmaceutical secondary metabolites, and provide 3150 calories per kilogram, and contain a high percentage of carbohydrate (total sugars, 44/88%), fat (0.2/0.5%), 15 salts and minerals, protein (2.3/5.6%), vitamins and a high percentage of dietary fiber (6.4/11.5%). They contain calcium, magnesium, phosphorus, potassium, iron,zinc, copper, manganese, selenium, vitamins A, A1, B, B1, B2, B3, B5, B6, and Cas well as a variety of amino acids [3]. The flesh of dates contains 20% moisture, between 50 and 67% sugar, 2.5%, 2% protein and less than 2% each of fat, minerals and pectic substances. Dates also contain thiamine, riboflavin, niacin, and pantothenic acid. These vitamins and minerals help the body produce haemoglobin, which isa protein in red blood cells that binds to oxygen and carries oxygen from the lungs to tissues. Jaggery is also known as Gur in north India and vellum or bellam in south India. It is having different names in different location depending upon its sources. Jaggery is a natural, traditional sweetener, prepared by concentrating the sugarcane juice. Jaggery prepared from sugarcane juice having lighter colour comparing to other jaggeries obtained from sap. Mineral like magnesium present in Jaggery strengthens human nervous. system and helps to relax body muscles, gives relief from fatigue and takescare of blood vessels. Jaggery contains potassium and low amount of sodium which helps to maintain the acid balance in the body cells, and also combats acids and acetone and controls body blood pressure[4]. Jaggery is called as rich source iron which helps to prevent anemia. Because of its anti-allergic properties, it helps to relief tension and takes care of asthma.

Cashew (Anacardium occidentale) belongs to Anacardiaceae family. Edible cashew kernels have been used as snack for centuries, They are used as a major ingredient in sweets and cooking, particularly in Asian cuisine. Cashews are healthy and packed with minerals and nutrients such as phosphorus, copper, and magnesium, not commonly found in other foods. They are also rich in tocopherols and phytosterols.The cashews have moisture content up to 5%, The that I have designed is completely new in market. Ladoo are popular and healthy snack and there are high potentials to increase the nutritional value by incorporating several ingredients. In the present study, the iron content and protein content of snack were improved by incorporating dates, flaxseeds and nuts etc. Snack food has increased urbanization and modernization [5]. However, most of thesnack contains high amount of fats, sugar and salts etc. and least amount of irons, proteins, dietary fibres and other minerals. Due to such situation consumers demand for healthy snacks is increasing. Thus, these ladoo can be considered as of the most desirable snacks due to their good eating quality andsuperior nutritional properties. The current product is rich in iron which can come in handy to the pregnant women's as well as women having menstrual problems (6). In both the condition women's lackin blood this snack indirectly helps in increasing blood.

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II. MATERIAL AND METHODS

A. Procurement of Materials for Ladoo

Raw materials required during present investigation were procured from local market of Saralgaon such as Dates, Cashews, Almonds, Cats, Flax seeds and Jaggery. The raw material were cleaned and made freefrom foreign matters.

Physical properties of dry fruit balls incorporated with flaxseeds (ladoor The colour of ingredients andproduct was determined by visual observations which was dark brown. The shape of the product was determined by visual observation which was round and diameter observed by vernier caliper, Chemical properties of dry fruit balls incorporated with flaxseeds (ladoo): Different chemical propertiesof samples were analysed for moisture content, ash, fat, protein and total carbohydrate. All the determinations were done in triplicate and the results were expressed as the average value. For moisture determination samples were dried in oven at 130°C for 60 minutes [7]. For ash determination samples were placed in muffled furnace at 550°C to burn out all carbon compounds. leaving in organic part (ash). Fat was determined by fat extraction unit by using n. Hexane.

III. SENSORY EVALUATION

Prepared product was evaluated for sensory characteristics in terms of appearance, color, flavour, aftertaste, texture and overall acceptability by 10 semi-trained panel members. comprised of academicstaff members using 9-point Hedonic scale. Judgments were made through rating the product on a 9 point Hedonic scale with corresponding descriptive terms ranging from 9 like extremely to I dislike extremely. The obtained results were recorded in sensory score card.

Storage of dry fruit balls incorporated with flaxseeds (ladoo): Storage of Dry Fruit Balls Incorporated withFlaxseeds (Ladoo) was done at two different condition viz, ambient storage (30°C) for a month and cool storage for a period of two months [8].

IV. STATISTICAL ANALYSIS

The analysis of variance of the data obtained was done by using Completely Randomized Design (CRD)for different treatments. per method as the given.

Selection of raw material

↓

(Pitted Dates, Almonds, Cashew, Flaxseed, Oats and Jaggery)

↓

Weighing, cleaning

↓

Roasting of Almonds, Cashew, Flaxseeds.

↓

OatsGrind the pitted dates in mixer grinder

↓

Grind roasted almonds, cashew, Flaxseeds, Cats separately

↓

mix well by using mixer grinder

↓

Make Jaggery syrup

↓

Add the Jaggery syrup in the mixture

↓

Knead the dough firmly by hands

↓

Make small round balls by using hands

↓

Packaging and labelling

↓

Storage

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Figure l: Flowsheet for Preparation of Dry Fruit Balls Incorporated with Flaxseeds (Ladoo)

V. RESULTS

	Units	Parameter	Unit
Size	45 cm	Ash	1.67
Bulk density	484 Kg/m³	Moisture Content	65.53%
True density	554.5 Kg/m³	Fat	0.14%
Angle of repose	20.05°	Protein	1.50%

Table 1: Physical and chemical Properties of Dates.

The physical parameters of dates were found to be Bulk Density (484 Kg/m³), angle of repose (20.05°), [9]. True Density 554.5 Kg/m³ and size (4-5 cm) and The chemical parameters of Dates was found to be moisture content (65.53%), fat (0.14%), protein (1.50%) and ash (1.67%) were more or less similar accordingly were more or less similar.

The physical parameters of flaxseeds was found that the bulk density decreased from (680-579 Kg/m³) and true density increased from (1067-1147 Kg/m³) were more or less similar accordingly were more or less similar [10]. The porosity was found out 46.65-44.89% and Angle of repose 27.6-35.80°. The chemical parameters of Flaxseeds were found out to be moisture content (6.99%), ash (4%), Protein(21.76%) and fat (42.4%) [11].

Parameter	Units	Parameter	Units
Bulk density	729.5 to 540.073 kg/m³.	Moisture Content	7.29 %
True density	1250-1809,797 kg	Ash	3,50 %
Angle of repose	26.86-38.7456	Protein	15-17%
------	---------	Fat	4.50%

Table 2: Physical and chemical Properties of Cats

The Physical Parameters of Cats was found that the bulk density varied from (729.5-540.073 kg/m³) and Angle of Repose (26.86-38.7456 True density was 1250-1809.797 kg/m². The chemical parameters of oats were found out to be moisture content (7.29%). The Ash content is about (3.5%). Protein content was (15-17%) and fat was about (4.5%).

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The physical Parameters ware Size 25.33 to 25.66 mm, Bulk density was 525 to 655 kg/m³. True Density1015 to 1115 kg/m³ and porosity was found out to be 35.32% to 53.21% The protein content is about 21.15 gms per 100 gm (approx. 23 almonds). The fat count is about 49.42 gms per 100 gm. The averagemoisture content is about 6.4% in almonds. The ash content in almond is about 2.97% [12].

Parameter	T	T	T
Colour	8	7.5	8
Flavour	7	7	7.5
Taste	7	8	8
Texture	8	8	8
Appearance	7.5	7.5	7.5
Overall acceptance	7.5	7.6	8

Table 3: Organoleptic Evaluation of Dry Fruit Balls Incorporated with Flaxseeds (Ladoos)

The sample T has highest score as compare to the other samples. The colour of Ty sample as per graph is8 point while samples T (08), T_2 (7.5). The flavour of sample T was acceptable with 7.5 while samples T, (07), T: (07). The texture of sample T3 was selected by 8 points while other samples points are T_1 (8), T2 (8). The appearance of sample Ts was selected by 7.5 while other samples points are T_1 (7.5), T, (7.5).

The taste of sample T_1 was selected by 8 points while other sample are T (07), T2 (08). The overall acceptability of sample T_1 was selected by 8 points while other samples points are T_1 (7.5), T2 (7.6).

VI. CONCLUSION

In the present study finally, it is concluded that Ladoos prepared from different variation of ingredients such as Dates, Almonds, Cashews, Oats, Jaggery Syrup and Flaxseeds has high Nutrition quality and also it is rich in Protein, carbohydrates and some vital minerals such as calcium and iron in proper amount and has great health benefits. The current product helps to produce blood and has great importance in human body these Ladoos are also developed considering the requirement of blood in pregnant women. These Dry Fruit Balls Incorporated with Flaxseeds is developed considering the requirement of blood in women. As women's go through menstrual cycle every month, they lose a lot blood from their body and many females sutter through Anaemia a very well know disease. The components in these Ladoos are recommended to increase blood in Ayurveda, The present investigation carried out for information of Ladoos in which Ts sample found more superior than sample T and T so, Ta sample is more acceptable on its sensory attributes.

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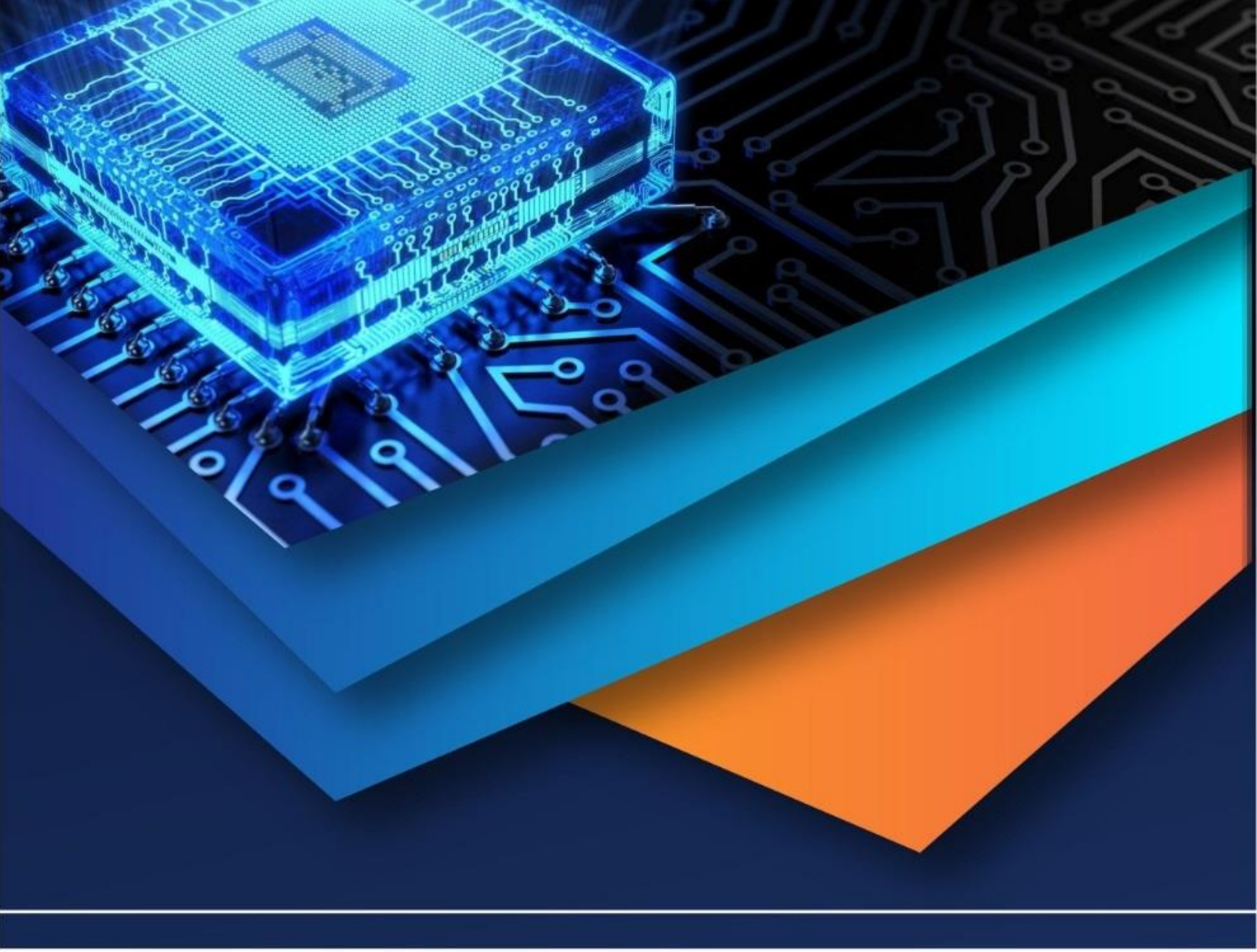

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