

Production of Eggless Pea Besan Cake Fortified With Peanut Yogurt and Flaxseed

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Submitted : 27 Aug 2024; Published : 14 Sept 2024

Citation: Ghosh, D. et al. (2024). Production of Eggless Pea Besan Cake Fortified With Peanut Yogurt and Flaxseed. J N food sci tech, 5(3):1-4. DOI : <https://doi.org/10.47485/2834-7854.1043>

Abstract

Pulses are an important source of nutrition for billions of people in the world. Large number of people in the world consumes pulses as staple food in combination with cereals for meeting their protein requirement. High amount of amino acids like, lysine and folate help pulses for making the composite flours with cereals. Legumes are valuable foods to fulfil the needs of the undernourished or under-served populations. Replacing energy-dense foods with legumes has been shown to have beneficial effects on the prevention and management of obesity and related disorders, such as cardiovascular disease, diabetes and the metabolic syndrome. Pulses, or the non-oilseed legumes (e.g., chickpeas, cowpeas, dry beans, dry peas, and lentils), i.e., 'Grain legumes' are widely recognized as a nutrient-dense food and one of the richest sources of dietary fiber and plant protein that also can be considered as superfood. Flaxseed cake with a high content of fibre and protein with great nutritional potential has some limited animal feed applications. We know that, functional foods can improve the overall metabolic status of our body of which milk is the perfect example because, it is a probiotic compound and contains viable bacteria which are beneficial to human body. However, milk fat intake is often associated with a high risk of suffering from cardiovascular disease (CVD) due to its high saturated fat content. The aim of this overview study is to shed light on the consuming cow's milk in combination with grain legume in the form of dry cake. Therefore, this study aimed to find out the health benefits of pulse consumption along with flaxseed fortification in eggless cake instead of direct milk intake required for positive outcomes to be achieved.

Keywords: Pea besan, flaxseed, peanut yogurt, fermentation, cholesterol, food industry.

Introduction

Flaxseed is one of the most important oilseed crops for industrial as well as food, feed, and fiber purposes. Almost every part of the flaxseed plant is utilized commercially, either directly or after processing (Parikh et al., 2019). Flaxseed is mainly known by its high alpha-linolenic acid content, but it is also a lignin source, soluble fibre and protein, compounds which are biologically active in the prevention of some non-transmissible chronic diseases (Hall III et al., 2006). According to Cunnane et al. (1995), antioxidant vitamins and lipid hydroperoxides in plasma were not significantly affected by flaxseed consumption. Bowel movements per week increased by 30% while flaxseed was consumed. We know, fermentation is an anaerobic biological process that converts sugars and starches into simpler substances. In baking, it causes yeast and bacteria to convert sugars into carbon dioxide, among other things. This is what causes the dough to rise. Wheat flour, sugar, egg and fat (depending on the type of cake) are the important ingredients in cake baking. Egg is being replaced with other protein sources, due to its cholesterol, high price and dietary issues. Furthermore, the vegans, vegetarians, and egg allergy consumers are not willing to use egg (Ashwini et al., 2009).

Pulses are an important source of dietary protein, energy, minerals and vitamins for the mankind. Chickpea is a good source of carbohydrates and protein, together constituting about 80% of the total dry seed mass in comparison to other pulses (Mishra et al., 2015).

There is a growing demand for an interest in egg replacement, due mainly to health problems (phenylketonuria, egg allergy) dietary preferences (vegan, vegetarian), and/or religious beliefs of consumers; and also to issues concerning sustainable food supply and economic factors for producers. In this regard, the food industry is searching for egg alternatives to produce partially or totally egg-replaced, in other words, eggless goods. Therefore, recent studies have focused on using egg replacers obtained from different sources in bakery products, particularly in cake formulations. Especially chickpea aquafaba has been shown to have great potential for egg replacement. Thus, using such egg replacers in cake production could represent a practical, sustainable, clean label, and cost-effective alternative; they are also easy to store and have long shelf life, compared to fresh eggs (Lin et al., 2017). For long, honey has been used as important source of carbohydrates and natural sweetener.

Antibacterial and antifungal activities of honey are well documented and characterized. The antimicrobial properties of honey have great potential for application in medicine as well as in food industry (Aurongeb et al., 2011). Honey prevents and treats gastrointestinal disorders such as peptic ulcers, gastritis, gastroenteritis and also poses prebiotic effects and promotes health of gastrointestinal tract (Almasaudi, 2021). In this research work, yogurt was used instead of eggs. For this fermented lactose free yogurt cake, the main ingredients were pea besan, peanut curd, wheat flour and honey.

Aims and Objectives

The objectives of this study are

- To assess the overall acceptability of the cake
- To determine the physicochemical property of the cake
- To determine the shelf life of the cake

Materials and Methods

Production of eggless peanut yogurt cake (Gómez et al., 2008)

- Selection of Ingredients: Wheat flour and besan were bought from local grocery store, Barrackpore, Kolkata, West Bengal. Peanut yogurt was made at home. Vegetable oil, butter, Sugar, milk, vanilla essence, flaxseed, honey and baking powder were bought from local market, Barrackpore, Kolkata, West Bengal.
- Equipments: Two medium size bowl, tea Spoon, tablespoon, measuring cup, whisker, weight machine, cake oven, butter paper.
- Development of Cakes: The cake was developed by incorporation peanut yogurt and besan powder was used. Two set of cakes were prepared and they were allowed for fermentation for 4 and 6 h respectively.
- Procedure of cake making: Two medium sized bowls were taken in which, 40 g each of wheat flour and pea besan powder were mixed well. In an another bowl, 60 g peanut curd, 35 g sugar powder, butter and small amount of oil and honey was taken and mixed well, then mix of wheat flour and pea besan was slowly added in this bowl along with 45 ml of milk. After the fermentation (4-6 h), 10 drops of vanilla essence, ½ tea spoon flax seeds and ½ tea spoon of baking powder and ½ tea spoon of baking soda were mixed properly. The mixture was poured into an aluminium foil into the pre heated cake pan for 40-45 min, then it was taken out from the oven having nicely brown color on top of the cake.

Physicochemical properties of peanut yogurt cake

Determination of moisture content

A clean Petri dish was dried in an oven for 30 min. The dish was transferred into a desiccator to cool using a pair of tongs. The cooled empty dish was weighted and the weight was recorded as W1. 10g of the test samples were weighted into the dish and the dish was reweighed and recorded as W2. The sample was dried into hot air oven and the weight was recorded. The dish and its dried content were then weighted and the reading was recorded as W3. The recorded weights i.e., W1, W2 and W3 were used to calculate the moisture content of the food sample using the formula % Moisture= (W2-W3)/ (W2-W1) X 100 Where; W1 = weight of empty dish, W2 = weight of dish + sample before drying, W3 = weight of dish + sample after drying (Stephen, 2016).

Estimation of vitamin C

It is atitrimetric method which depend on the reduction of the blue dye 2, 6 dichlorophenolindophenol to a colorless compound by ascorbic acid in solution or in extract made out of foodstuff. Ascorbic acid is a strong reducing agent, it reduces the dye 2, 6 dichlorophenolindophenol and gets converted to dehydro ascorbic acid. After equivalence point is reached the next drop of dye gives a pink color to the solution indicating the end point. The dye in this titration is colored in the oxidized form and colourless in reduced form. The dye is pink in the acidic solution.

In this process, 10 g cake was mixed with 90 ml meta-phosphoric acid and made upto the total volume of 100 ml. The burette was filled up with dye 2, 6 dichlorophenolindophenol solution. The mixture was poured into a titration flask and titrates against the dye solution to the appearance of light pink color (George, 2023).

Sensory evaluation

The cake samples were given to 100 persons for evaluating taste, aroma, color, texture, appearance and general evolution on a 9 point hedonic scale with a score ranging from 9 to 1 which represents extremely good and extremely disgusted respectively (Srilakshmi, 2003). The collected data was analyzed and plotted in Microsoft office excel 2007, and compared the overall acceptability of those samples.

Results and Discussion

In this Study, two types of cakes were prepared:

Sample 1, fermented for 4 h and sample 2, fermented for 6 h.

Table 1: Physicochemical analyses of cake

Sample (cake)	Fermentation time	Moisture content (%)	Vitamin C content (mg/10g)
1	4 h	18.61	3.37 ± 0.54
2	6 h	10.28	2.83 ± 0.48

The experiment was done in triplicate.

Table 2: Nutritive value and cost calculation of sample 1 and sample 2
Nutritional analysis

Ingredients	Energy (kcal)	Carbohydrate (g)	Protein (g)	Fat (g)
Refined wheat flour	142.10	29.58	4.74	0.39
Pea besan	162.20	24.76	8.40	2.24
Vegetable oil	270	0	0	30
Peanut curd	325.21	25.46	8.90	22.21
Milk	26.19	2.16	1.20	1.2
Honey	32	8	0	0
Butter	72.2	0	0.05	8
Sugar powder	135.4	10	0	0

Table 3: Production Cost of fortified eggless cake with peanut yogurt:

Serial number	Ingredients	Amount	Quantity	Cost (Rs)
1	Refined wheat flour	44 Rs/ kg	40 g	2.08
2	Pea besan	140 Rs/kg	40 g	5.60
3	Vegetable oil	131 Rs/L	30 ml	3.93
4	Peanut curd	153 Rs/500 g	60 g	18.37
5	Milk	37 Rs/500 ml	45 ml	3.33
6	Honey	63 Rs/100 g	10 g	6.30
7	Butter	54.5 Rs/100 g	10 g	5.45
8	Sugar powder	50 Rs/ kg	35 g	1.75
			Total = 270 g	Total cost = 46.81

Table 4: Sensory evaluation of cake

Sample (cake)	Taste	Aroma	Color	Texture	Appearance	Overall acceptability
1	9	8	8	9	9	8
2	9	8	9	8	9	9

Discussion

The cake samples were stored for 7 days to detect shelf life and it was observed that the cake was refreshed up to 7 days in room temperature without using any types of chemical or preservatives.

Moisture Content can be one of the most important analyses performed on the food product. Moisture is the quality factor in the preservation of some products and effects stability in dehydrated vegetables, fruits, dried milk, dehydrated potatoes, spices and herbs. Moisture is also used as the quality factor of cakes. Water is the major constituent of most food products. The amount of moisture is a measure of yield and quantity of food solids, and can be a direct index of economic value, stability, and quality of food products (Park, 2008). In Table 1, sample 1 contained more moisture (%) than sample 2. After 7 days stored cakes were slightly dry and lost its moisture. The higher moisture content for cakes could be the higher chances for acceptance. So, the composition of Sample-1 was the best for eggless peanut yogurt cake. So, the Sample 1 was better than sample 2. Estimation of vitamin C is the important analysis performed on the food product. Peanut yogurt contained negligible quantity of vitamin C. Sample 1 contained more vitamin C than Sample 2 (Table 1). From Table

2 (Table 2 and Table 3), it was observed that, production of eggless peanut yogurt is cost effective compared to the market selling egg cake and also it is nutritionally more acceptable. Sensory analysis showed that, both the cake samples showed very good overall acceptability by the consumers (Table 4) that would make good impact in large scale production in the food industry.

Conclusion

In this study, from the above results it is concluded that the cakes with using chick pea flour and peanut curd can improve the nutritional quality and as this cake is eggless, it is acceptable for people of all ages. Peanut yogurt is rich in protein and vitamin C. Protein is essential for building and repairing tissues and it can also help with weight management and satiety. The probiotic properties of peanut curd can improve digestion, boost the immune system, and even improve mood. Eggless cake can lower the cholesterol level, reduces hypertension, promotes weight loss and improves the digestive system. It is easy to buy for all categories of people in society. This cake is pocket friendly and, from sensory evaluation, the results shows that the cakes are good in quality and has its maximum consumer acceptance.

Acknowledgement

We acknowledge our college authority to carry on the research work properly.

Future Aspect of the Study

We can enhance the research work on utilizing the pulses, consumable seeds in association with probiotics to prepare different kinds of nutritive cake in future that will be economically much more appreciable by the food lovers in large-scale industrial production.

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