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Research Article

Development and Evaluation of Jackfruit Fusion of Shrikhand

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Abstract
This work explores about the Jackfruit incorporated Shrikhand, tracing its origin, ingredients, preparation methods. Jackfruit is a tropical fruit most of the people not know about the nutrition of jackfruit. It is a fiber rich and consists of proteins, carbohydrates, potassium and phyto-chemicals such as flavonoids, saponins, and tannins. Jackfruit acts against the cancer, maintain the cholesterol levels, lowers the blood pressure and helps to alters the blood glucose levels, improves the digestion. Shrikhand is a popular Indian dessert made from strained yogurt with sugar, cinnamon, and cardamom. It has a creamy and mouth feels texture and a sweet aromatic taste. Some of the people does not likes the yogurt, this is another way to consume the yogurt. They can get the nutrition of yogurt. Shrikhand consists of proteins, probiotics which helps to maintain the gut health, the cardamom and cinnamon contains the antioxidants, which helps to protect the cells from damage. Shrikhand is fermented yogurt dessert. Three samples are formulated with ratio of curd, sugar, Jackfruit pulp (1L: 50g: 150g), (1L: 100g: 100g), (1L: 150g: 50g),.. the developed and finalized product is then evaluated for physico-chemical, textural, functional and sensory attributes.
Keywords: Jackfruit pulp, Yogurt, Sugar, Cinnamon, Cardamom.

Introduction

According to FSSAI (2011), Shrikhand means the product obtained from Chakka or Skimmed milk Chakka to which milk fat is added. It may contain fruits, nuts, sugar, cardamom, saffron and other spices. It shall not contain any added color and artificial flavor substances. Shrikhand is a traditional sweet of the Indian subcontinent made from strained yogurt. It is a traditional yogurt based dessert popular in Gujarati, Maharashtra and Marathi. Shrikhand is semi- soft smoothie, creamy texture it consists of sweetish sour, whole milk product prepared from curd (Singh and Singh, 2014). This is a traditional Indian dish is popular dessert that is made from hung curd and flavored with saffron and cardamom. The first historical Shrikhand was developed by *Herdsmen* used to hang the curd in a cotton cloth to remove the whey water which is suitable for carrying easily during long distance travel it can form a water free semi solid part called Chakka. They can add the sugar and dry fruits (Wikipedia, 2024). According to Patel and Chakraborthy studies shows that Shrikhand can be stored at not more than 10 ^{0}C (Anant *et al.,* 2016). Shrikhand is prepared with the combination of fruits like banana, mango and other etc., now we can use the Jackfruit pulp to develop the new product with high nutrition.

Jackfruit is a tropical fruits species found in tropical and high rainfall areas of the world. It belongs to family *Moraceae.* Scientific name of jackfruit is *Artocarpus hetrophyllus* (Prakash *et al.,* 2009). The health benefits of jackfruit are still underway. The Jackfruit bulb and jackfruitseeds are good sources of protein, starch, and minerals. Jackfruit also contains phytonutrients, i.e., lignins, isoflavones and saponins, and they have numerous health benefits such as anticancer, antiaging and antioxidant. The nutraceutical characteristics of jackfruit bulb and its effect on various diseases was studied by (Baliga *et al.,* 2011). Jackfruit has lots of nutritional properties it contains minerals like zinc, magnesium, calcium, potassium, sodium and organic acids like malic acid, and citric acid it consists of major nutrients like pectin, carotene, flavonoids, volatile, sterols, tannins and polyphenols (Amadi, *et al.,* 2018). Jackfruit also consists of vitamin A, vitamin C, thiamin, riboflavin. When we have to incorporate the grinded jackfruit pulp into the hang curd i.e., Chakka it can enhance their nutrient values. The Jackfruit has health benefits like reduce the cholesterol levels in the body due to the fiber, it can alters the level of cholesterol, reduce the gastric effects mainly it can reduce the risk of heart disease. The low contents of sodium shows the effect on blood pressure it treats the high BP patients, and also useful for skin health, bone and stomach. Jackfruit consists of high natural sugars when we add these natural sugarsinto the hang curd improve their flavor taste and nutrition (Booth and Altomara, 2024).

Jackfruit pulp incorporated Shrikhand may needs the little amount of adding external sugars that's why it was able to take by the diabetic patients. When we compare the plain Shrikhand to Jackfruit fusion Shrikhand, the new formulated Shrikhand has more nutritional value, due to the incorporation of their nutrients into the Chakka. The nutrition from the curd and Jackfruit pulp they were combine obtain the high nutrition food which was healthy and mouth feel dessert it can used as a combination to paratha, chapathi, puri and other etc. (Ranasinghe *et al.,* 2019). Jackfruit incorporated Shrikhand which can provides a digestible, palatable and distinct flavor dessert. It can reduce the gastro-intestinal disorders (Chopade, *et al.,* 2022).

Materials and Method

Jackfruit incorporated Shrikhand can be prepared by using the following materials and methods.
Materials required for making Jackfruit incorporated Shrikhand:

1) Milk
2) Jackfruit pulp
3) Sugar
4) Cinnamon
5) Cardamom

Methods:

Preparation of Chakka from Curd:

Preparing Chakka (hung curd) for Shrikhand is a crucial step to achieve the desired creamy and thick consistency. Here's how you can prepare Chakka for making Shrikhand:

- ✓ Buffalo milk standardized at 7% fat and 9% SNF was used for the purpose of making Jackfruit pulp incorporated Shrikhand.
- ✓ Curd can be prepared by using the SNF milk.
- ✓ The curd transferred into a muslin cloth to remove the excess whey water from the curd.
- ✓ After hanging, carefully unwrap the cloth bundle and transfer the thickened yogurt (Chakka)into a clean bowl. It should have a consistency similar to soft cheese.

Preparation of Jackfruit Pulp:

The Jackfruit pulp can be prepared in two different ways i.e., by

- ✓ Direct extractions of pulp and grinded well make to a paste add into the chakka directly without any kind of external processing.
- ✓ Extractions of pulp from Jackfruit cut into small pieces where is added to the sugarsyrup boil until the water evaporated from the fruit pulp, this pulp which can increases the shelf life of fruit.
- ✓ The Jackfruit pulp incorporated Shrikhand can be prepared with three different compositions i.e., 50g, 100g and 150g of pulp with variation in sugar levels i.e., 150g, 100g and 50g. The Chakka is

prepared by using one liter of curd, the Chakka mixed with required amount of jackfruit pulp, sugar, cardamom and cinnamon, which contains vitamins, minerals, and antioxidants. It is easily digestible, palatable food having nutrients like fats, proteins and calorific values.

Procedure:

- ✓ Milk is boiled at 95°C and cool it until it reaches to room temperature, then add a few drops of culture make it as curd.
- ✓ Hang the plain yogurt in a muslin cloth over a bowl for 4-6 hours, or overnight, todrain excess water and create Chakka (thickened yogurt).
- ✓ If using fresh jackfruit, remove seeds and chop the flesh into pieces. Blend into asmooth pulp. If using canned jackfruit, drain and blend into a smooth consistency.
- ✓ In a mixing bowl, combine the Chakka (thickened yogurt), jackfruit pulp mix it well.
- ✓ Then add powdered sugar if it is required, cardamom powder, cinnamon powder andsaffron strands (optional). Mix well until smooth and creamy.
- ✓ Stored at not less than 10 degree centigrade (Dadarwal, *et al.,* 2005).

Figure 1. Jackfruit.

Figure 2. Curd.

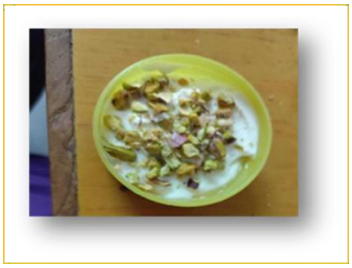

Figure 3. Jackfruit incorporated Shrikhand.

The samples are prepared by using different amount of ingredients in making the products are shown in the table.

Table 1. Formulation of Jackfruit pulp incorporated Shrikhand.

Ingredients	**Sample 1**	**Sample 2**	**Sample 3**
Curd	1 liter	1liter	1 liter
Sugar	150 g	100g	50g
Jackfruit pulp	50g	100g	150g
Cardamom	2g	2g	2g
Cinnamon	2g	2g	2g

Developing Jackfruit-incorporated Shrikhand encourages culinary exploration and experimentation. It opens avenues for using seasonal fruits and adapting traditional recipes to modern tastes and dietary preferences. Jackfruit is rich in vitamins, minerals, and dietary fiber. By incorporating jackfruit into Shrikhand, you introduce these nutritional benefits into a traditional dessert, making it more wholesome. Shrikhand is a traditional Indian dessert often made during festivals and special occasions. By incorporating jackfruit, which is a popular fruit in Southeast Asia and other tropical regions, you create a fusion dessert that bridges culinary traditions and flavors.

These three compositions show the versatility of Jackfruit-incorporated Shrikhand, catering to different preferences for sweetness, texture, and additional flavors. Each composition provides a unique culinary experience, highlighting the adaptability of Shrikhand to incorporate tropical fruits and nuts while retaining its traditional essence. Experimenting with these compositions allows for exploring various combinations that appeal to diverse palates and preferences, enriching the culinary landscape with innovative dessert options.

Each composition can be marketed differently, highlighting its unique ingredients and flavors. This can attract attention and curiosity from consumers looking for new and exciting dessert options. In

essence, developing Jackfruit-incorporated Shrikhand with three different compositions not only expands culinary horizons but also opens up opportunities for market differentiation, nutritional enhancement, and consumer satisfaction through variety andinnovation. It's a way to leverage the natural appeal of jackfruit while offering delicious and unique dessert choices.

Results and Discussions

Jackfruit-incorporated Shrikhand offers several potential benefits and advantages that make it an interesting recipe to develop.

Sensory Evaluation:

Sensory evaluation aims to gather unbiased and standardized data about the sensory characteristics of products. It involves the consumers who provide feedback based on their sensory experiences. This is a process to know about the taste, flavor, appearance, consistency and overall acceptability of the three samples with comparison of control.

Table 2. Sensory evaluation.

Sensory attributes	Control	Sample 1	Sample 2	Sample 3
Color	9	8	9	8
Flavor	8	7	8	7
Consistency	9	8	9	8
Taste	8	7	9	8
Appearance	9	7	8	8
Overall acceptability	9	7	9	8

Hedonic Scale: 9-Excellent, 8-Very Good, 7-Good, 6-Slightly Like, 5-Neither Like nor Dislike, 4-Dislike Slightly, 3-Dislike Moderately, 2-Dislike Very Much, 1-Dislike.

The mean values of sample can be calculated and the majority value of sample can be taken into the consideration for new product development. According to the sensory evaluation the sample-2 can be selected for further procedure.

The finalized product can be determined by using sensory evaluation then undergoes the physio-chemical analysis. To determine the nutritional content i.e., by

Physico-chemical Analysis:

Moisture Content:

Determining the water content in the product by using microwave moisture analyzer (Amreen, *et al.,* 2017).

Total Solids:

To extend the process of determining the moisture content process remains the solids byweighing the remain solids it represents the total solids (Manvendra Singh, 2015).

pH:

To assess the acidity and alkalinity of the product.

Fat:

To determine the fat content in the Jackfruit incorporated Shrikhand by using the Soxhletextraction method.

Fat content can be calculated by using the following formulae

Fat content (%) = Weight of sample/Weight of extracted fat x 100

Protein:

To determine the protein content in the Jackfruit incorporated Shrikhand by using Kjeldhal method.

Protein content can be calculated by using the following formula
Protein content (%) = (N × 6.25)/W × 100

Carbohydrates:
To determine the carbohydrates in the given sample by using Fehling Solution (Hermann von Fehling, 1849).

Table 3. Physico-chemical analysis of Jackfruit incorporated Shrikhand.

Nutrition	Control	Sample-2
Moisture	60%	65%
Ash	2%	15%
pH	3.8	4.7
Total solids	32%	42%
Fat	7%	9%
Protein	12%	13%
Carbohydrates	18%	49%

Nutritional Composition of Jackfruit Incorporated Shrikhand:

- ✓ Jackfruit-incorporated Shrikhand provides a balanced profile of carbohydrates, proteins, and fats, with the primary source being yogurt and jackfruit pulp.
- ✓ It offers significant amounts of vitamins and minerals, particularly vitamin C from jackfruit and calcium from yogurt.
- ✓ The calorie count per serving was within acceptable limits for a dessert, making it a potentially healthier alternative to other sweets.

Table 4. Nutritional analysis of Jackfruit incorporated Shrikhand.

Nutrients	Amount of serving for 100g
Sodium	40mg
Calcium	150mg
Iron	0.5mg
Vitamin –A	100IU
Vitamin -C	15-19mg
Dietary fiber	1.5-2g
Sugars	18g
Calories	150k.cal

Conclusion

In conclusion, Jackfruit-incorporated Shrikhand offers a blend of nutrition, unique flavor, cultural appeal, and culinary innovation. It presents an opportunity to create a dessert that is not only delicious but also reflects diverse culinary influences and health-conscious choices. Its development can lead to new culinary trends and consumer preferences in the realm of desserts and sweet treats. The incorporation of ripe jackfruit in Shrikhand enriches its nutritional profile with essential vitamins such as Vitamin A and Vitamin C, pivotal for immune function and overall health. Furthermore, the dietary fiber content aids in digestive health, catering to conscientious consumers seeking both flavor and functional benefits in their culinary choices.

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