

Microbial Analysis of Shrikhand Prepared from Dragon Fruit Pulp, Sapota Pulp and Rose Powder

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Abstract— *The microbial analysis of shrikhand prepared from dragon fruit pulp, sapota pulp, and rose powder was conducted to assess the safety and quality of this novel dairy product. Shrikhand, a traditional Indian dessert, was prepared by incorporating dragon fruit pulp, known for its antioxidant properties, sapota pulp, rich in vitamins and minerals, and rose powder, which imparts fragrance and flavor. The microbial analysis focused on including yeasts, and molds. The results indicated the presence of lactic acid bacteria (LAB), which are expected in fermented dairy products, while pathogenic bacteria and spoilage organisms were absent or present in minimal quantities. The study emphasizes the importance of maintaining proper hygiene during preparation and storage, as well as the need for refrigeration to inhibit microbial growth. These findings suggest that shrikhand prepared with dragon fruit pulp, sapota pulp, and rose powder is microbiologically safe when prepared under controlled conditions, offering a nutritious and flavorful alternative to traditional shrikhand. The shelf-life of the product was also evaluated, highlighting the stability of microbial content during storage.*

Index Terms- *Microbial changes, yeast and mold, shelf life.*

I. INTRODUCTION

Since ancient times, fermented milk and milk products have been important in meeting the nutritional and health needs of people all over the world. Fermented milk products are well known for their anti-cholesterolemic, anti-carcinogenic, and therapeutic properties. Among the numerous important and well-known fermented milk products, dahi, a popular indigenous product generated by lactic acid fermentation, is being converted into shrikhand due to its longer shelf life. A popular Indian treat produced by fermenting milk is called Shrikhand. It has a semi-soft consistency and a sweet-sour flavor. Shrikhand

originated in Persia and was transported to the Gujarat state beaches by Parsi Zohrastrian settlers using Frasi-shir (milk) and Khand (sugar) (Amreen *et al.*, 2017).

1.1 SHRIKHAND

Shrikhand is traditionally made by boiling milk (cow, buffalo, or mixed) and allowing it to cool to room temperature, which is between 300 and 350 degrees Celsius. The warm and chilled milk is then mixed with 0.5 to 1 percent of the dahi prepared the previous day. For the whole night, milk is let to sit steadily at room temperature without being moved. After stirring and letting it hang on a muslin cloth for ten to twelve hours, the whey is drained away. The curd mass left over after the whey is extracted is called chakka. Chakka is served cold once the proper amount of sugar, color, and flavor have been added, as well as any extra optional ingredients such fruits, nuts, spices, and herbs. Shrikhand is currently widely available in the market in a number of tastes, such as Amrakhand, Badam Pista, Butter Scotch, Elaichi, Kesar, Mango, Rajbhog, and Strawberry. When adding milk fat from skim milk chakka to manufacture shrikhand, it should be free of harmful bacteria. Shrikhand should avoid using any foreign ingredients in its milk save those that are permitted. The product shouldn't be very thick or thin and should have a smooth consistency. There should be no separation or syrupy pockets on the shrikhand's body (Pal and Devrani, 2018).

1.2 DRAGON FRUIT

The pitaya is a foreign fruit (*Hylocereus undatus*), sometimes referred to as the dragon fruit, strawberry pear, or thang. The Dragon fruit is a nonclimacteric fruit that loses quality when preserved after reaching its maximum eating quality when mature. The dragon fruit (*Hylocereus undatus*) is a medium-sized to large

berry with a crimson peel and green or red fleshy scales on the outside. The white, delicious flesh contains many tiny black seeds that can be used to make wine, jams, marmalades, juice, and other drinks. Pitaya is a recently grown fruit that is sold and consumed all over the world due to its high nutritional value. Mitcham and Freitas (2013).

1.3 SAPOTA FRUIT

In addition to popular tropical and subtropical fruits like mango, banana, and jackfruit, sapota (*Manikaraachras Mill.*), sometimes known as chikoo, is another well-known fruit. Soft and easily digested, sapota pulp is rich in easily absorbed carbohydrates such as sucrose and fructose. In India, about 84,000 hectares are used for sapota cultivation, which produces 9,06,000 MT yearly (National Horticultural Board, 2019–20). Bananas, sapota, and guava are calorie-dense fruits. One hundred grams of an ounce is predicted to give 83 calories, which is roughly equivalent to sweet potatoes. Given that it supplies 12–20% of the daily requirement for sugar, it is a fruit that is vital to nutrition. The fruits are rich in calcium, potassium, phosphorus, iron, and carotene due to their high levels of protein, fat, and fiber. They also provide iron, which is essential for the production of hemoglobin. This fruit contains a significant amount of tannin, an antioxidant polyphenolic compound. It has qualities that are antibacterial, antiviral, anti-inflammatory, and anti-parasitic. Sapota is a source of vitamin C, offering 24.5% of the daily recommended intake per 100 grams of fruit, as well as vitamin A, which provides 25% of the daily recommended intake. In addition to other important nutrients, it is high in potassium, copper, niacin, and pantothenic acid.

1.4 ROSE PETAL POWDER:

Rose petals can be consumed and have historically been utilized as a body cooling agent, as well as a relaxant for nerves and muscles, and as a tonic to address gastrointestinal problems and allergic reactions. Rose petal marmalade or gulkand, rose water, rose petal tea, and various other forms have all been employed for medicinal purposes. The primary components of rose petals include fiber, vitamin C, vitamin A, and several other minerals. However, the therapeutic effects of roses are mainly attributed to the presence of phytochemicals. Rose petals contain terpenes, glycosides, flavonoids, and anthocyanins,

which are beneficial for health. As noted by Nadaf *et al.*, (2012), rose flowers comprise compounds such as B-citronellol, carboxylic acid, myrcene, nonadecane, quercetin, geraniol, nerol, phenethyl alcohol, heneicosane, and kaempferol.

II. MATERIAL AND METHODS

2.1 Materials

All the raw materials were collected from the local market at Prayagraj.

2.2 Microbial analysis

The yeast and mould count in product was determined according to the Manual in Microbiological Testing FSSAI manual (2012).

2.3 Storage of Shrikhand

Storage study was conducted at a temperature of 5-7°C for 35 days and the sample was analyzed at a regular interval of 7 days for physico-chemical, microbiological and sensory parameters.

2.4 Statical Analysis

The data was analyzed using Analysis of Variance (ANOVA) and Critical difference (C.D) in WASP software (RBD design) and MS office, 2010.

III. RESULTS AND DISCUSSION

Shrikhand samples were prepared according to different combinations of Chakka, Dragon Fruit, Sapota Fruit and Rose P. powder in different treatments as mentioned in materials and methods chapter. *Shrikhand* samples were subjected to microbiological analysis.

The treatment which obtained significantly higher value ($P < 0.05$) was adjudged as the optimized product or the best combination of lactulose and litchi pulp that can be incorporated into *shrikhand* sample which will lead to higher overall acceptability among the consumer.

Table 1: Influence of storage period on Yeast and Mold of Shrikhand

Treatments	Yeast and
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				mould (per g)
T ₀	100%	-	-	3.55
T ₁	90%	5%	5%	3.25
T ₂	85%	10%	5%	4.00
T ₃	80%	15%	5%	4.05
T ₄	75%	20%	5%	5.05
T ₅	85%	5%	10%	4.75
T ₆	80%	10%	10%	3.75
T ₇	75%	15%	10%	4.25
T ₈	70%	20%	10%	5.50
T ₉	80%	5%	15%	5.75
T ₁₀	75%	10%	15%	4.25
T ₁₁	70%	15%	15%	5.50
T ₁₂	65%	20%	15%	5.75
T ₁₃	75%	5%	20%	5.25
T ₁₄	70%	10%	20%	5.00
T ₁₅	65%	15%	20%	5.75
T ₁₆	60%	20%	20%	5.75
	Chakka (%)	Dragon Fruit Pulp (%)	Sapota Fruit Pulp (%)	

3.1 Yeast and Mold Count

Table 1 presents the data on the content of yeast and molds, and Fig. 1 shows the data visually. The information shows that every treatment differed considerably from the others.

The average data in the table indicates that the range of the Yeast and Molds content of various combinations of Chakka, Dragon Fruit, Sapota Fruit, and Rose P. powder of various treatments was 3.25 to 5.75 percent. The percentages of yeast and molds in the various treatments—T₀, T₁, T₂, T₃, T₄, T₅, T₆, T₇, T₈, T₉, T₁₀, T₁₁, T₁₂, T₁₃, T₁₄, T₁₅, and T₁₆—were found to be 3.55, 3.25, 4.00, 4.05, 5.05, 4.75, 3.75, 4.25, 5.50, 5.75, 4.25, 5.50, 5.75, 5.25, 5.00, 5.75, and 5.75 percent, respectively.

Perusal of data on Yeast and Molds content in shrikhand sample for the combinations of Chakka, Dragon Fruit, Sapota Fruit and Rose P. powder

samples of different treatments furnished in Table 1 and figure 1, it was noted that highest mean yeast and mold percentage was recorded in T₉(5.75), T₁₂ (5.75), T₁₅ (5.75), T₁₆ (5.75), T₈ (5.50), T₁₁ (5.50), T₁₃ (5.25), T₄ (5.05), T₁₄ (5.00), T₅ (4.75), T₇ (4.25), T₁₀ (4.25), T₃ (4.05), T₂ (4.00), T₆ (3.75), T₀ (3.55), T₁ (3.25).

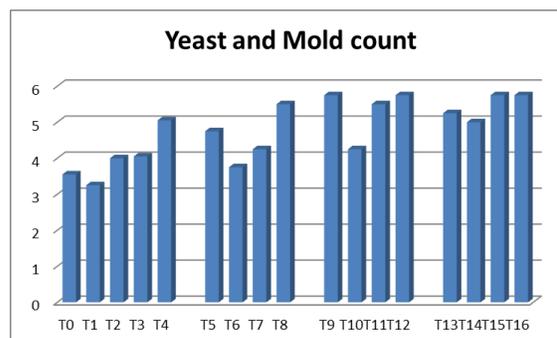


Fig. 1. Yeast and Mold count of Prepared Shrikhand

CONCLUSION

The microbial analysis of shrikhand prepared from dragon fruit pulp, sapota pulp, and rose powder provides essential insights into the safety and quality of the product. The analysis likely revealed the presence of both beneficial microorganisms, such as lactic acid bacteria, and potentially harmful microbes, depending on the preparation and storage conditions. The addition of dragon fruit, sapota pulp, and rose powder could influence microbial growth due to their nutritional composition and natural antimicrobial properties. If beneficial microbes were prevalent and harmful pathogens were absent or minimal, it would suggest that the shrikhand is microbiologically safe for consumption. Proper fermentation and storage techniques are critical in maintaining the quality and safety of the product. Overall, the microbial analysis helps ensure that the shrikhand is safe, nutritious, and has an acceptable shelf life, guiding potential improvements in production methods to enhance its safety and consumer appeal.

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