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# Preparation and quality assessment of Shrikhand prepared by using Buffalo milk blended with Stevia leaf powder

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### Abstract

Shrikhand is one of the major fermented indigenous milk product, which is gaining more popularity in modern societies of the developing countries. They are highly nutritious product because of increased vitamin contents as selective cultures are being used in preparation of curd. Stevia is a natural sweetener with zero calories has recently found widespread use in the food and pharmaceutical industries. The basic aim of study was to find out the quality parameters of Shrikhand prepared by using Stevia leaf powder at different level of the concentration of Stevia leaf powder were 2%, 4% and 6 % for treatments T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> respectively. While control sample T<sub>0</sub> was prepared from 100% of buffalo milk. The data collected on different aspects were tabulated and analysed statistically using of analysis of variance and critical difference. Physicochemical analysis (protein, fat, total solids, moisture, ash, acidity and carbohydrate) was done for estimating its nutritional content and organoleptic characteristics (flavour and taste, body and texture, colour and appearance, overall acceptability) were judged by panel on 9 point hedonic scale. Overall acceptability score for treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were 7.73, 8.06, 7.90 and 7.66 respectively. based on organoleptic evaluation analysis, treatment T<sub>1</sub> with 2% Stevia leaf powder was found to be the best. Thus, the treatment can be rated as T<sub>1</sub>>T<sub>2</sub>>T<sub>3</sub>>T<sub>0</sub>.

**Keywords:** shrikhand, stevia

### Introduction

Shrikhand is a semi-soft, sweetish sour, whole milk product prepared from lactic acid fermented curd. The curd is partially strained through a muslin cloth to remove the whey to produce a solid mass called Chakka. This Chakka is mixed with the required amount of sugar to yield Shrikhand (De, 1982) [6]. Because of the change in the economic status and food habit of consumers the other varieties of Shrikhand such as fruit Shrikhand are also in great Demand (Singh, 2007) [15]. There has been a large increase in the number of diabetes patients worldwide because of change in lifestyle and diet. *Stevia rebaudiana* (Bert.) Bertoni as a natural sweetener with zero calories has recently found widespread use in the food and pharmaceutical industries. The leaves of this sweet herb have been used for centuries as sweetener to counteract the bitter taste of various plant based medicines and beverages by indigenous Guarani Indians of the Paraguayan highlands (Brandle *et al.*, 1998) [4]. In India, *Stevia* has been introduced in the last decade because of high demand potentials particularly considering the huge diabetic population. It has been successfully cultivated in many Indian states like Rajasthan, Maharashtra, Punjab, Kerala and Orissa. High demands for natural sweeteners as compared to artificial ones have driven the farmers in India toward large-scale *Stevia* cultivation (Goyal *et al.*, 2010) [10]. Stevioidal glycosides from *Stevia* offer a solution for prevention of complex diabetic problems and obesity in modern mankind. Diterpene glycosides not have mutagenic, teratogenic, and carcinogenic effects (Barriocanal *et al.*, 2008) [5], (Mogra *et al.*, 2009) [14]. Shrikhand is a delicious and delightful dessert of western India. As shrikhand is served cool and it may also cool your body during summers. It is highly rich in calcium and vitamin B. Calcium is good for teeth and bones and hence it is known for maintaining health. Vitamin B helps to absorb calcium from whatever you consume. Vitamin-B in take which calcium is extremely beneficial. Shrikhand is the fermented milk product if it is prepared with Stevia powder (*Stevia rebaudiana* Bertoni). Stevia produces strength to bones and beneficial for diabetes and metabolic syndrome.

It also controls blood sugar and insulin levels and lower the blood pressure. Dried Stevia leaves contains 10% amino acids, 18% proteins, 33% carbohydrates and 39% reducing sugars, source of vitamins (niacin, thiamine, rutin, ascorbic acid) and minerals (potassium, calcium, magnesium, phosphorus, manganese, silicon, chromium, iron and zinc).

#### Objectives are given below

1. To prepare Shrikhand with different levels of stevia leaf powder.
2. To assess the chemical quality of Shrikhand. Physico-chemical & Microbiological & sensory quality of Shrikhand.

#### Materials and Methods

Stevia leaf powder arishtha online sites and Starter culture were collected from NDRI karnal SL-1, and from, whereas the required analytical grade chemicals and compounds were obtained from the research lab of "Cyto Gene research & development" B- block chauraha, Indranagar, Lucknow, UP. Four treatment samples were studied and each treatment was replicated for five times. Average values for physico-chemical, microbial and organoleptic analysis were recorded for the final product. The final products were analysed for percent ash, acidity, carbohydrate, fat, moisture, protein and total solid. Microbial analysis involved estimation of coliform count and yeast & mould count. Organoleptic analysis was carried out on 9 point hedonic scale to judge for body & texture, colour & appearance, flavour & taste and over-all acceptability.

#### Treatment combination (ratio)

- T<sub>0</sub>- Control sample prepared from Chakka (100:00).
- T<sub>1</sub>- Experimental sample prepared from Chakka and Stevia leaf powder (98:02).
- T<sub>2</sub>- Experimental sample prepared from Chakka and Stevia leaf powder (96:04).
- T<sub>3</sub>- Experimental sample prepared from Chakka and Stevia leaf powder (94:06).

#### Technical programme

The following analysis were conducted during the investigation.

#### 1. Chemical analysis of experimental Shrikhand

**Carbohydrate Percentage:** Was estimated by using lane and enyon method given in (IS: 1050, 1983)<sup>[12]</sup>.

**Protein Percentage:** Was estimated by using Kjeldhal method given in IS (Part II) 1981<sup>[11]</sup>.

**Fat Percentage:** The fat content of Shrikhand was determined by Soxhlet method as described in AOAC Method 934.01.

**Ash Percentage:** The per cent ash were estimated as per procedure given in A.O.A.C. (1975)<sup>[2]</sup>.

**Total solid Percentage:** The total solids content were determined by gravimetric method as per IS: 1479 (Part II), 1961<sup>[9]</sup>.

**Moisture Percentage:** The moisture content of Shrikhand was determined by standard procedure described by Anonymous (1959)<sup>[1]</sup>.

**Acidity Percentage:** The acidity of milk expressed as per cent lactic acid were determined by IS: 1479 (Part-I), 1960.

#### 2. Organoleptic analysis (9 point Hedonic scale)

The product was served to a panel of judges for organoleptic evaluation. They were provided with nine points hedonic score card for evaluation as described in IS: 6273 (Part-II), 1971<sup>[10]</sup>. The Shrikhand was evaluated by the judges for sensory attributes like appearance, flavour and body and texture.

#### 3. Microbial analysis of experimental Shrikhand by IS: 1947 (Part -III)

- a) Yeast and Mould
- b) Coliform

#### 4. Statistical analysis

The statistical design adopted to study the different aspects was Randomized Block Design using nine treatments with six replications.

- a) Number of treatments: 4
- b) Number of replications: 5
- c) Total number of trials: 20

#### Preparation of experimental Shrikhand

Fresh pasteurized buffalo milk with 6 % fat and 9 % SNF in required quantity. Milk was heated at 85° C for 30 mins. It was cooled to 20°C and inoculated by the starter culture (*Streptococcus lactis*) at the rate of 2 % and incubated at 28°-30° C for 8 hours until a firm coagulam was formed. Coagulam was then crushed and was transferred to a muslin cloth and pressed in a hoop for expulsion of whey for 6-8 hours. The semi solid mass left after drainage of whey is called Chakka; the base for Shrikhand. Chakka was mixed with Stevia leaf powder in three different formulations 2%, 4% and 6%. The mixture was well kneaded for uniform mixing.

#### Result and Discussion

**Average data for different parameters of control and experimental Shrikhand**

Parameters	Scores/ values based on mean value of different parameters of treatments				S/NS
Chemical analysis in percent					
Treatment	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	
Fat	13.50	13.56	13.62	13.69	S
Protein	7.47	7.71	7.95	8.19	S
Moisture	39.89	38.97	37.32	35.57	S
Carbohydrate	38.42	39.76	41.11	42.00	S
Ash	0.72	0.57	1.03	1.18	S
Total solids	60.11	61.03	62.68	64.33	S
Acidity % (LA)	0.86	0.93	0.99	1.01	S
2. Microbiological count					

Yeast & mould (cfu/gm)	5.00	6.50	6.10	7.00	S
Coliform(10 <sup>1</sup> /ml)	Nil	Nil	Nil	Nil	Nil
<b>3. Organoleptic scores</b>					
Colour& appearance	7.87	8.13	7.92	7.72	S
Flavour& taste	7.56	8.21	7.98	7.63	S
Body and texture	7.79	8.11	7.84	7.66	S
Overall acceptability	7.73	8.06	7.90	7.66	S

### Physico-chemical analysis

#### Moisture Percentage

There was significant difference in moisture percentage in different treatment combination. Maximum moisture of 39.89% was found in the treatment T<sub>0</sub> followed by treatments T<sub>1</sub> (38.97), T<sub>2</sub> (37.32) and T<sub>3</sub> (35.57).

The difference in moisture was due to the different ratios of Stevia leaf powder in different experimental treatments.

#### Fat Percentage

There was significant difference in fat percentage in different treatment combination. Maximum fat of 13.69% was found in the treatment T<sub>3</sub> followed by treatments T<sub>2</sub> (13.62), T<sub>1</sub> (13.56) and T<sub>0</sub> (13.50).

The difference in fat was due to the different ratios of Stevia leaf powder in different experimental treatments.

#### Ash Percentage

There was significant difference in ash percentage in different treatment combination. Maximum ash of 1.18 % was found in the treatment T<sub>3</sub> followed by treatments T<sub>2</sub> (1.03), T<sub>0</sub> (0.72) and T<sub>1</sub> (0.57).

The difference in Ash was due to the different ratios of Stevia leaf powder in different experimental treatments.

#### Protein Percentage

There was significant difference in protein percentage in different treatment combination. Maximum protein of 8.19 % was found in the treatment T<sub>3</sub> followed by treatments T<sub>2</sub> (7.95), T<sub>1</sub> (7.71) and T<sub>0</sub> (7.47).

The difference in protein was due to the different ratios of Stevia leaf powder in different experimental treatments.

#### Acidity Percentage

There was significant difference in acidity percentage in different treatment combination. Maximum acidity of 1.01 % was found in the treatment T<sub>3</sub> followed by treatments T<sub>2</sub> (0.99), T<sub>1</sub> (0.93) and T<sub>0</sub> (0.86).

The difference in acidity was due to the different ratios of Stevia leaf powder in different experimental treatments.

#### Carbohydrate Percentage

There was significant difference in carbohydrate percentage in different treatment combination. Maximum carbohydrate of 42.0 % was found in the treatment T<sub>3</sub> followed by treatments T<sub>2</sub> (41.11), T<sub>1</sub> (39.76) and T<sub>0</sub> (38.42).

The difference in carbohydrate was r due to the different ratios of Stevia leaf powder in different experimental treatments.

#### Total solid Percentage

There was significant difference in total solid percentage in different treatment combination. Maximum total solid of 64.33 % was found in the treatment T<sub>3</sub> followed by treatments T<sub>2</sub> (62.68), T<sub>1</sub> (61.03) and T<sub>0</sub> (60.11).

The difference in TS was due to the different ratios of Stevia leaf powder in different experimental treatments.

### Microbial analysis

#### Yeast & Mold count

There was significant difference in yeast and moulds cont were observed in different treatment combination. Maximum yeast and mould score of 7.0 was found in the treatment T<sub>3</sub> followed by treatments T<sub>1</sub> (6.5), T<sub>2</sub> (6.1) and T<sub>0</sub> (5.0).

#### Coliform count

In each treatment of prepared Shrikhand the coliform count was nil.

### Organoleptic scores

#### Color & appearance

There was significant difference in color & appearance scores observed in different treatment combination. Maximum color & appearance score of 8.13 was found in the treatment T<sub>1</sub> followed by treatments T<sub>2</sub> (7.92), T<sub>0</sub> (7.87) and T<sub>3</sub> (7.72).

#### Body & texture

There was significant difference in body & texture scores observed in different treatment combination. Maximum body & texture score of 8.11 was found in the treatment T<sub>1</sub> followed by treatments T<sub>2</sub> (7.84), T<sub>0</sub> (7.79) and T<sub>3</sub> (7.66).

#### Flavor & Taste

There was significant difference in flavor & taste scores observed in different treatment combination. Maximum flavor & taste score of 8.2 was found in the treatment T<sub>1</sub> followed by treatments T<sub>2</sub> (7.98), T<sub>3</sub> (7.63) and T<sub>0</sub> (7.56).

#### Overall acceptability

There was significant difference in overall acceptability scores observed in different treatment combination. Maximum overall acceptability score of 8.06 was found in the treatment T<sub>1</sub> followed by treatments T<sub>2</sub> (7.90), T<sub>0</sub> (7.73) and T<sub>3</sub> (7.66).

### Conclusion

From present investigation it can be stated that Stevia leaf powder can be very well utilized with buffalo milk for preparation of palatable and nutritious Shrikhand by blending them in three different formulations. The product obtained was subjected for chemical, microbial and organoleptic evaluation by panel of judges. It was observed that as the quantity of Stevia leaf powder increased, there significant. Was increase in total solid, fat, protein, ash, acidity and carbohydrate Also, there was decrease in moisture content. It was also observed that the overall acceptability score for treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> was 7.73, 8.06, 7.90 and 7.66, respectively. The blend of treatment T<sub>1</sub> was more acceptable than treatment T<sub>2</sub> and T<sub>3</sub> due to higher overall acceptability score and lesser ash content which followed legal standards for ash content.

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