



RESEARCH PAPER

Preparation of omega-3 enriched probiotic *Shrikhand* using walnut powder

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SUMMARY :

Walnut contains Omega-3 fatty acids and which is helpful in treating variety of health condition like high blood pressure, heart diseases, Asthama, high cholesterol. Yoghurt is useful in gastrointestinal disorders *i.e.* diarrhea and constipation and easily digested by lactose intolerance person. Different proportion of walnut powder, 0% walnut powder T₀, 5% walnut powder T₁, 10% walnut powder T₂ and 15% walnut powder T₃ was prepared and studied for acceptability. 2% yoghurt culture was used for preparation of probiotic *shrikhand*, by using yoghurt strains as *Lactobacillus bulgaricus* and *Streptococcus thermophilus*, was formed within four hours. It was observed that chemical composition of all four treatments was nearly same for some constituents but for constituents like fat and total solid the proportion went on increasing with treatment. *Shrikhand* prepared from 10% walnut powder T₂ was more acceptable scoring highest between “like very much to Like extremely” rather than remaining three treatments. Cost of product of *Shrikhand* prepared from 10% walnut powder T₂ was 134.84 Rs/kg. Cost of product was increased as the proportion of walnut powder increased.

KEY WORDS : *Shrikhand*, Walnut, Omega-3, Buffalo milk, Yoghurt, Product acceptability, Cost of product

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Yoghurt are prepared by fermentation of milk with bacterial cultures consisting of a mixture of *Streptococcus* subsp. *thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus* (Lee and Lucey, 2010). The therapeutic properties of yoghurt may be attributed to elaboration of bacteriocin like compounds and microbes in the starter culture which exhibit antagonism against flora (Sarkar and Mishra, 2002).

Walnut are rich source of energy and contain many health benefiting nutrients, minerals, antioxidants and vitamins that are essential for optimum health. Regular intake of walnuts in the diet help to lower cholesterol. They are also excellent source of vitamin, required for maintaining the integrity of cell membrane of mucus membranes and skin protecting it from harmful oxygen free radicals. Omega-3s are essential fatty acids,

meaning your body cannot manufacture them. Hence, they have to come from a dietary source. Omega-3s have an important role in maintaining the cellular integrity, in the brain cells and in the arterial linings.

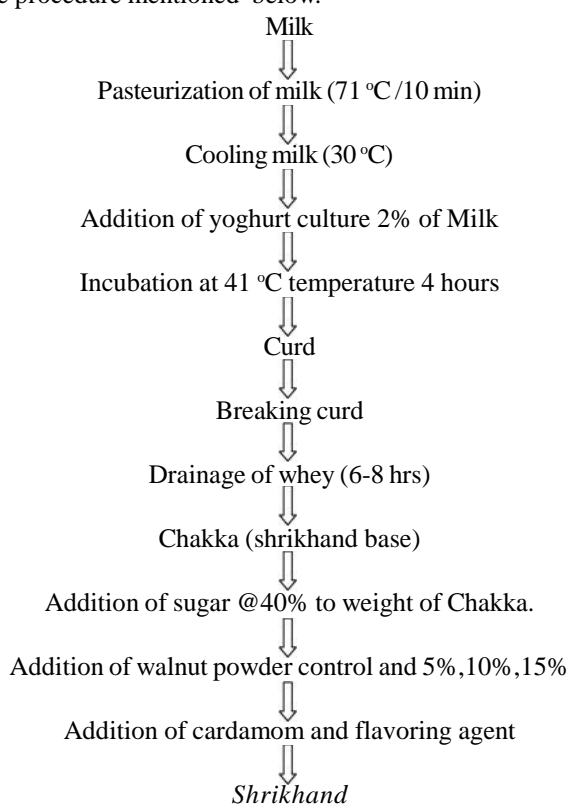
Most of the research on the health benefits of the omega-3 fatty acids has centered on their role in cardiovascular disease (CVD) prevention. Epidemiological and clinical studies have shown that the consumption of omega-3 fatty acids can reduce the incidence of CVD, and substantially benefit individuals at risk of coronary heart disease (CHD) (Kris Etherton, *et al.*, 2003). Nuts may protect against coronary heart disease through a number of mechanisms and up to eight constituents might contribute to the positive nutritional benefits of nuts. Most nuts are rich in arginine, a precursor of nitric oxide, a potent vasodilator which can inhibit platelet aggregation. Walnut

contain about 10% Alpha linolenic acid which has been associated with risk in several prospective studies possibly due to antithrombotic and antirhythmic effects of Alpha linolenic acid. Other proposed benefits of nuts include their high content of magnesium, copper, folic acid, potassium, fibre and vitamin E (Savage, 2001).

Because of nutritive value of *Shrikhand* and therapeutic benefits of yoghurt culture and walnut, it is proposed to prepare omega-3 enriched probiotic *Shrikhand* using walnut powder.

EXPERIMENTAL METHODS

Preparation of *Shrikhand*: The *Shrikhand* is prepared as per the procedure mentioned below.



Acceptability of product :

The extent of acceptability of product was judged by organoleptic test using nine point hedonic scale (Gupta, 1976).

Chemical composition :

Titrate acidity of product (as per cent lactic acid) was determined according to the method, specified in part-1 of IS 1479 (ISI 1960). pH was measured using digital pH meter.

Total solids of *shrikhand* was determined by the method described in IS 1479 (part – 11) 1961. The ash content of *shrikhand* was determined as per procedure described in IS 1479 (part-11), (IS, 1961). The protein content of *Shrikhand*

was determined by method described in A.O.A.C. (1965). Fat content of *shrikhand* was determined as per procedure described by Choudhari (1959). Lactose content of probiotic *shrikhand* was determined as per procedure described in laboratory manual of dairy science, Department Dairy science Veterinary College Tirupati 1962. Cost of the product was determined as per ingredients used and the prevailing market prize.

Treatment details :

- T₀ - Preparation of probiotic *Shrikhand* using yoghurt culture.
- T₁ - Preparation of probiotic *Shrikhand* using yoghurt culture and addition of 5 per cent walnut powder.
- T₂ - Preparation of probiotic *Shrikhand* using yoghurt culture and addition of 10 per cent walnut powder.
- T₃ - Preparation of probiotic *Shrikhand* using yoghurt culture and addition of 15 per cent walnut powder

EXPERIMENTAL FINDINGS AND ANALYSIS

The findings of the present study as well as relevant discussion have been presented under following heads :

Yield of chakka :

The data on yield of chakka used for preparation of *Shrikhand* are presented in Table 1. Treatment T₀ (control) represents chakka prepared employing yoghurt culture and treatment T₁ represents chakka prepared employing yoghurt culture and addition of 5% walnut powder, T₂ represents chakka prepared employing yoghurt culture and addition of 10% walnut powder, T₃ represents chakka prepared employing yoghurt culture and addition of 15% walnut powder. The results are mean values of six replications.

It was observed that from 1000 g of buffalo milk 395g of chakka and 605g of whey were obtained in treatment T₀, in treatment T₁ 393 g of chakka and 607 g of whey were obtained, in treatment T₂ 395 g of chakka and 605 g of whey were obtained and in treatment T₃ 394 g of chakka and 606 g of whey were obtained. The recovery of chakka for treatments T₀, T₁, T₂ and T₃ were 39.5, 39.3, 39.5, and 39.4 per cent, respectively.

There were no significant differences in respect of per cent recovery of chakka in four treatments.

Rachkonda (1995) prepared *Shrikhand* from cow milk using *Lactobacillus acidophilus* and recorded per cent recovery of chakka as 38. Recovery of chakka was slightly higher in control treatment T₀ compared to treatment T₁.

Chemical composition of *Shrikhand* :

The moisture, total solid, fat, protein, lactose, ash, acidity, pH, content of *Shrikhand* for treatment T₀ was 42.95, 57.05, 7.95, 6.26, 2.46, 0.38, 1.21 and 4.64, for treatment T₁ was 41.68,

58.32, 8.10, 6.03, 2.48, 0.45, 1.26 and 4.58, for treatment T₂ was 40.50, 59.50, 8.20, 6.50, 2.50, 0.50, 1.27 and 4.52 and for treatment T₃ was 39.04, 60.96, 8.22, 6.95, 2.52, 0.55, 1.29, and 4.50 per cent, respectively.

It was observed that there were no significant differences as regard to various constituents of *Shrikhand* within four treatments. It was observed from result that as the proportion of walnut powder increased total solid content was also increased.

The results on composition of *Shrikhand* are in accordance with result reported by Chakraborty (1985). He reported chemical composition of *Shrikhand* as total solid 58.9, total protein 6.9, sucrose 40.9, reducing sugar 1.6 and fat 6.0 per cent.

Acceptability of *Shrikhand* :

The mean score for overall acceptability of *Shrikhand* for treatment T₀ was 7.97, the overall acceptability of T₁ was 8.11, the overall acceptability for treatment T₂ was 8.12 and the overall acceptability for treatment T₃ was 7.77 (Table 2). The overall acceptability may be regarded as the general criteria for acceptance and marketability of product from the consumers

point of view.

It was observed that overall acceptability of *Shrikhand* was accepted up to treatment T₂, then as proportion of walnut powder increased acceptability score decreased.

Niturkar (1989) recorded the score for overall acceptability as 6.90 for formulated product kheer from vermicelli whereas Chede (1993) recorded that score as 8.06 for formulated soy *Shrikhand*.

Cost of product :

On the basis of experimental trials, the estimated quantities of ingredient required for preparing one kilogram of *Shrikhand* was worked out and cost was calculated on the basis of prevailing market prices. The cost for fuel, labour charges were assumed. From the Table 3 cost of the control/*Shrikhand* T₀ was 121.60 Rs/kg, for T₁ treatment cost was 134.84 Rs/kg, for T₂ treatment cost was 141.8 Rs/kg and for T₃ treatment cost was 147.18 Rs/kg. As the proportion of walnut powder increased cost of product was increased.

Kuttabadkar (2002) reported cost of production of *Shrikhand* prepared from buffalo milk and it's blend with

Table 1: Yield of chakka

Treatments	Quantity of milk (g)	Chakka obtained (g)	Per cent recovery of chikka	Whey obtained (g)
T ₀	1000	395	39.5	605
T ₁	1000	393	39.3	607
T ₂	1000	395	39.5	605
T ₃	1000	394	39.4	606

Table 2 : Score card showing acceptability of *Shrikhand* (Overall Acceptability)

Treatments / Replications	Colour and appearance	Body and texture	Flavour	Taste	Mean
T ₀	7.75	8.03	8	8.1	7.97
T ₁	8.05	7.9	8.2	8.3	8.11
T ₂	8	7.8	8.28	8.4	8.12
T ₃	7.8	7.3	8.0	8.0	7.77

Table 3 : Cost of *Shrikhand* (per kg) cost incurred in preparation of *Shrikhand*

Sr. No.	Particulars cost/kg	T ₀		T ₁		T ₂		T ₃	
		Qty. (g)	Rate (Rs.)	Qty. (g)	Rate (Rs.)	Qty. (g)	Rate (Rs.)	Qty. (g)	Rate (Rs.)
1.	Milk @ 40/Lit	1000	40	1000	40	1000	40	1000	40
2.	Culture	20	6	20	6	20	6	20	6
3.	Sugar @ 40 per cent of weight of chakka	158	5.3	158	5.3	158	5.3	158	5.3
4.	Cardamom @ 1100/kg	-	1	-	1	-	1	-	1
5.	Labour	-	5	-	5	-	5	-	5
6.	Fuel	-	3	-	3	-	3	-	3
7.	Colour and flavour	-	5	-	5	-	5	-	5
8.	Miscellaneous	-	2	-	2	-	2	-	2
9.	Walnut powder	-	-	19.75	9.8	39.50	18.96	59.25	29.40
	Total wt. of <i>Shrikhand</i>	553	67.3	571	77.1	607.96	86.26	657	96.7
	Cost/kg	1000	121.60	1000	134.84	1000	141.8	1000	147.18

safflower milk was calculated. It was observed that as proportion of safflower milk in blend increased there was decrease in cost of production of *Shrikhand*.

Summary and Conclusion :

This project on preparation of omega 3 enriched probiotic *Shrikhand* using walnut powder has the applicability in the development of nutritious and healthy food products. Yoghurt strains are probiotic strains were used in this project. Health and therapeutic benefits of yoghurt stains and walnut powder were incorporated in the product. Walnut containing omega 3 fatty acid which is essential for the body. These acid are helpful in treating a variety of health condition like high blood pressure, heart disease, asthma, and high cholesterol means this project is beneficial for the development of functional food in the field of food biotechnology.

Shrikhand product is commercially manufactured by organized sectors of Dairy Industry and widely popular in the western part of India and it served as special delicacy during festival and ceremonial occasions.

In the present investigation it was found that the composition of all four treatments was nearly same for some constituents but for constituents like fat, total solid the proportion went on increasing with treatment. The mean sensory for overall acceptability of *Shrikhand* of treatment T₀ was 7.97, for treatment T₁ it was 8.11, for treatment T₂ it was 8.12 and for treatment T₃ it was 7.77. These observations indicated that there were significant differences among the four treatment for overall acceptability of *Shrikhand*. Among these four treatment T₂ Treatment was most acceptable comparing to the other treatment. Cost of the product increased as the proportion of walnut powder increased.

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