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, Asthma, 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 T1 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 T1 was 134.84 Rs/kg. Cost of product was increased as the proportion of walnut powder increased.

KEY WORDS: Shrikhand, Walnut, Omega-3, Buffalow milk, Yogurt, Product acceptability, Cost of product


Yogurt 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 antithrombic and antirrhymic 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.

- **Milk**
- Pasteurization of milk (71 °C/10 min)
- Cooling milk (30 °C)
- Addition of yoghurt culture 2% of Milk
- Incubation at 41 °C temperature 4 hours
- Curd
- Breaking curd
- Drainage of whey (6-8 hrs)
- Chakka (shrikhand base)
- Addition of sugar @40% to weight of Chakka.
- Addition of walnut powder control and 5%, 10%, 15%
- Addition of cardamom and flavoring agent

**Shrikhand**

**Acceptability of product:**

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

**Chemical composition:**

Titratable 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:**

- **T_0** - Preparation of probiotic Shrikhand using yoghurt culture.
- **T_1** - Preparation of probiotic Shrikhand using yoghurt culture and addition of 5 per cent walnut powder.
- **T_2** - Preparation of probiotic Shrikhand using yoghurt culture and addition of 10 per cent walnut powder.
- **T_3** - 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 T_0 (control) represents chakka prepared employing yoghurt culture and treatment T_1 represents chakka prepared employing yoghurt culture and addition of 5% walnut powder, T_2 represents chakka prepared employing yoghurt culture and addition of 10% walnut powder, T_3 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 T_0, in treatment T_1 393 g of chakka and 607 g of whey were obtained, in treatment T_2 395 g of chakka and 605 g of whey were obtained and in treatment T_3 394 g of chakka and 606 g of whey were obtained. The recovery of chakka for treatments T_0, T_1, T_2 and T_3 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 T_0 compared to treatment T_1.

**Chemical composition of Shrikhand:**

The moisture, total solid, fat, protein, lactose, ash, acidity, pH, content of Shrikhand for treatment T_0 was 42.95, 57.05, 7.95, 6.26, 2.46, 0.38, 1.21 and 4.64, for treatment T_1 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

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<th>Table 1: Yield of chakka</th>
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<th>Table 2: Score card showing acceptability of Shrikhand (Overall Acceptability)</th>
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<td>Treatments / Replications</td>
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<th>Table 3: Cost of Shrikhand (per kg) cost incurred in preparation of Shrikhand</th>
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<td>Total wt. of Shrikhand</td>
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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 strains 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 T_0 was 7.97, for treatment T_1 it was 8.11, for treatment T_2 it was 8.12 and for treatment T_3 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 T_2 Treatment was most acceptable comparing to the other treatment. Cost of the product increased as the proportion of walnut powder increased.

LITERATURE CITED
PREPARATION OF OMEGA-3 ENRICHED PROBIOTIC Shrikhand USING WALNUT POWDER


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