



ISSN: 2277- 7695

TPI 2015; 4(8): 81-84

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www.thepharmajournal.com

Received: 12-08-2015

Accepted: 13-09-2015

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Preparation of herbal Shrikhand prepared with basil (*Ocimum basilicum*) extract

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Abstract

Shrikhand is a popular Indian dessert prepared by fermentation of milk. It has a semi-soft consistency and is sweetish sour in taste. Preparation of herbal shrikhand was carried out by incorporating aqueous basil extract @ 1%, 2%, 3% and 4%, indicated as T₁, T₂, T₃ and T₄ respectively, where T₀ being the control sample with no basil extract and was evaluated on various physico-chemical, organoleptic and microbiological parameters. Five treatments combination were replicated five times and used in the study. The physico- chemical analysis results shows that treatment 4 (T₄) possess maximum moisture, protein, ash content, antioxidant activity, acidity while the control sample (T₀) has maximum total solids, fat content and pH.

Keywords: Herb, Shrikhand, Basil extract.

Introduction

Fermented milk and milk products occupy a place in satisfying nutritional requirements of human being since the time antiquity. Fermented milk products have been well recognized to have therapeutic, anticholesterolemic, anticarcinogenic properties (Boghra and Mathur 2000) [3]. Fermented milk products not only are consumed directly but often form starting materials from which other dairy products are also manufactured (Thapa, 2000) [11]. Shrikhand is a semi-soft, sweetish-sour, whole milk product prepared from lactic fermented curd. The curd (Dahi) is partially strained through a muslin cloth to remove the whey and thus produce a solid mass called Chakka, the basic ingredient for Shrikhand (Singh *et al.*, 2014) [9]. Shrikhand is one of the important fermented milk products which derive its name from the Sanskrit word “Shikharani” meaning a curd prepared with added sugar, flavouring agents (Saffron), fruits and nuts. It is popular in western part, especially in Maharashtra, Gujarat and Karnataka. Shrikhand is known for its high nutritive, characteristic flavour, taste, palatable nature and possible therapeutic value. It is very refreshing particularly during summer months. It can be recommended as health food for specific patients suffering from obesity and cardiovascular disease due to its low fat and sugar contents (Swapna and Chavannavar 2013) [10].

Ocimum basilicum L. (Lamiaceae), respectively, named Basil, is an aromatic herb that has been used traditionally as a medicinal herb in the treatment of headaches, coughs, diarrhea, constipation, warts, worms and kidney malfunctions (Mahajan *et al.*, 2013) [18]. It has a long history as culinary herb, thanks to its foliage adding a distinctive flavor to many foods. It is also a source of aroma compounds and essential oils containing biologically active constituents that possess insecticidal, nematicidal, fungistatic and antimicrobial properties (Kumar *et al.*, 2010) [7].

The extracts obtained from the plant are extensively brought to use for curing various diseases such as the common cold, inflammation, malaria, heart disease, headaches, stomach disorders, kidney stones, heart disorders, and many more. The Indian basil Tulsi also aids in the purification of atmosphere. Tulsi plant serves as a fabulous repellent for fighting against flies, mosquitoes and insects. It is especially valuable in combating malarial fever. (Hakkim *et al.*, 2007, Kumar *et al.*, 2010) [6,7].

Materials and Methods

Manufacturing Control and Experimental Shrikhand

Preparation of curd

Standardized whole milk (6% fat and 9% SNF) is heated to 90 °C and then cooled to 30-32 °C. It is then inoculated @ 1% with the Shrikhand culture, which is mixed well, and incubated at 30 °C till the curd sets firmly (acidity 0.7-0.8% lactic acid).

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Preparation of Chakka

The curd so formed is broken and placed in a muslin cloth bag and hang on a peg for the removal of whey for 8-10 hours, during this period, the whey from the curd will drain off and the solid mass thus obtained is called Chakka, which is the shrikhanda base.

Preparation of Control Shrikhand

The Chakka is then admixed with sugar (crystal or ground) and kneaded for uniform mixing. The product so obtained is the Control Shrikhand sample which has got no basil extract.

Preparation of Experimental Shrikhand

For the Experimental Shrikhand, the Chakka is mixed with the sugar and aqueous basil extract in different percentages i.e., 1% Basil extract for T₁, 2% for treatment T₂, 3% for T₃ and 4% for treatment T₄. The product is then filled in cups followed by its cooling at 10-12 °C. The samples were analyzed for Physicochemical, microbial and organoleptic qualities as per the procedure laid down by Anonymous (1972) [2].

Details of different treatments

Materials	Different treatments (Herbal Shrikhand made from Chakka(6% fat and 9% SNF)				
	T ₀	T ₁	T ₂	T ₃	T ₄
Basil extract	-	1%	2%	3%	4%

Organoleptic Evaluation of the prepared product:

Freshly prepared low cost paneer were served to panel members consisting of 5 experienced persons using 9 point hedonic scale proforma as suggested by Amerine *et.al.* (1965) [1].

Statistical analysis

The data obtained on different aspects as per plan were tabulated and statistically analyzed as per Chandel (1991) [4].

Result and Discussion

Average of different physiochemical parameters of Control and herbal shrikhanda

Table 1 shows average of different physiochemical parameters of Control and herbal Shrikhand

Moisture percentage

The highest mean value for moisture percentage in herbal Shrikhand (41.94) was obtained from the treatment T₄ followed by T₃(41.46), T₂ (41.4) and T₁ (40.1). The minimum score (39.88) was obtained in T₀ (control). There were significant differences found among the treatments. F Value was 130.871, indicating significant effect of treatment on moisture percentage (Fig. 1).

Total Solids percentage

The highest mean value for total solids percentage in herbal Shrikhand (60.12) was obtained from the treatment T₀ (control) followed by T₁ (59.54), T₂ (58.96) and T₃ (58.54). The minimum score (58.06) was obtained in T₄. There were significant differences found among the treatments. F Value was 129.741, indicating significant effect of treatment on total solids percentage (Fig. 1).

Protein percentage

The highest mean value for protein percentage in herbal Shrikhand (8.61) was obtained from the treatment T₄ followed by T₃ (8.36), T₂ (8.07) and T₁ (7.77). The minimum score (7.47) was obtained in T₀ (control). There were significant differences found among the treatments. F Value was 55.662, indicating significant effect of treatment on protein percentage (Fig. 1).

Table 1: Average of different physiochemical parameters of Control and herbal shrikhanda

Parameters (%)	Control and herbal shrikhanda					F Value	CD
	T ₀	T ₁	T ₂	T ₃	T ₄		
Moisture	39.88	40.46	41.04	41.46	41.94	130.871*	0.213
Total Solids	60.12	59.54	58.96	58.54	58.06	129.741*	0.269
Protein	7.47	7.77	8.07	8.36	8.61	55.662*	0.182
Fat	13.50	12.75	12.00	11.18	10.58	122.478*	0.318
Carbohydrates	38.42	39.10	38.10	38.18	38.04	112.321*	0.660
Ash	0.72	0.74	0.78	0.82	0.84	62.693*	0.018
Titration Acidity #	0.76	0.83	0.89	0.91	0.95	119.755*	0.020
pH	4.36	4.46	4.58	4.70	4.84	51.648*	0.079
Antioxidant Activity	0	11.50	22.92	55.00	71.75	356.810*	4.785

* Significant at 5 % level
 ** Non-significant at 5 % level
 # As per Lactic Acid.

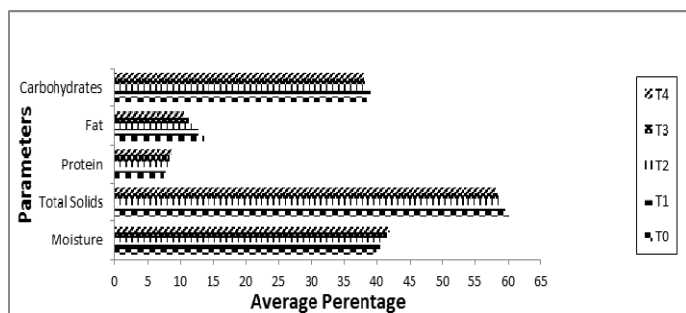


Fig 1: Average of different physiochemical parameters of Control and herbal shrikhanda.

Fat percentage

The highest mean value for fat percentage in herbal shrikhanda (13.50) was obtained from the treatment T₀ followed by T₁ (12.75), T₂ (12.00) and T₃ (11.18). The minimum score (10.58) was obtained in T₄. There were significant differences found among the treatments. F Value was 122.478, indicating significant effect of treatment on fat percentage (Fig. 1).

Carbohydrates

The highest mean value for carbohydrates percentage in herbal Shrikhand (39.10) was obtained from the treatment T₁ followed by T₀ (38.42), T₃ (38.18) and T₂ (38.10). The

minimum score (38.04) was obtained in T₄. There were significant differences found among the treatments. F Value was 112.321, indicating significant effect of treatment on Carbohydrates (Fig. 1).

Ash percentage

The highest mean value for ash percentage in herbal Shrikhand (0.84) was obtained from the treatment T₄ followed by T₃ (0.82), T₂ (0.78) and T₁ (0.74). The minimum score (0.72) was obtained in T₀ (control). There were significant differences found among the treatments. F Value was 62.693, indicating significant effect of treatment on ash percentage (Fig. 2).

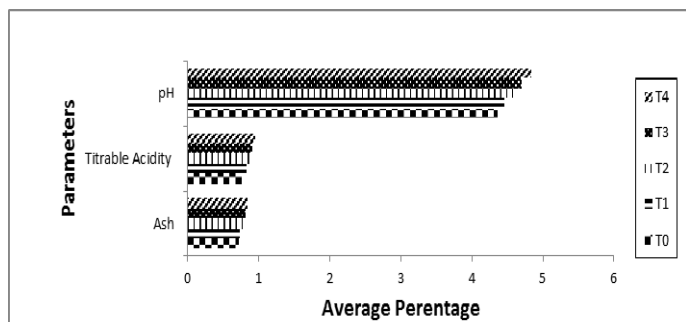


Fig 2: Average of different physiochemical parameters of Control and herbal Shrikhand

Antioxidant activity

The highest mean value for antioxidant activity in herbal Shrikhand (71.75) was obtained from the treatment T₄ followed by T₃ (55.00), T₂ (22.92) and T₁ (11.50). No antioxidant activity was observed in T₀ (control) sample. There were significant differences found among the treatments. F Value was 356.810, indicating significant effect of treatment on antioxidant activity.

Titration acidity percentage

The highest mean value for titration acidity percentage in Herbal Shrikhand (0.95) was obtained from the treatment T₄ followed by T₃ (0.91), T₂ (0.89) and T₁ (0.83). The minimum score (0.76) was obtained in T₀ (control). There were significant differences found among the treatments. F Value was 119.755, indicating significant effect of treatment on titration acidity percentage (Fig. 2).

pH value

The highest mean value for pH value in Herbal Shrikhand (4.84) was obtained from the treatment T₄ followed by T₃ (4.70), T₂ (4.58) and T₁ (4.46). The minimum score (4.36) was obtained in T₀ (control). There were significant differences found among the treatments. F Value was 51.648, indicating significant effect of treatment on pH value (Fig. 2).

Average of microbial parameters of control and herbal shrikhand

Table-2 shows Average of microbial parameters of control and herbal shrikhand. The highest mean score for yeast and moulds in herbal Shrikhand (6.80) was obtained from the treatment T₀ followed by T₄ (6.20), T₁ and T₃ (5.60). The minimum score (4.80) was obtained in T₂.

None of the samples of herbal Shrikhand i.e., control and experimental samples showed the presence of the coliforms at 0 day. The entire sample, at all the stages, were found gram-negative, which indicates proper hygienic conditions were maintained during the preparation and storage of the product.

Table 2: Average of microbial parameters of control and herbal shrikhand

Parameters	Control and herbal shrikhand					F Value	CD
	T ₀	T ₁	T ₂	T ₃	T ₄		
Yeast & Moulds(cfu/g)	2.60	2.60	3.60	3.60	2.40	7.467*	0.821
Coliform count (10 ¹ /ml)	N	N	N	N	N	-	-

* Significant at 5 % level

** Non-significant at 5 % level

Organoleptic Parameters of Control and herbal shrikhand

Table-1 shows different organoleptic parameters of control and herbal shrikhand.

Colour and Appearance

The highest mean score for colour and appearance in herbal Shrikhand (8.13) was obtained from the treatment T₃ followed by T₂ (7.92), T₀ (7.87) and T₁ (7.72). The minimum score (7.13) was obtained in T₄. There were significant differences found among the treatments. F Value was 37.519, indicating significant effect of treatment on colour and appearance.

Body and Texture

The highest mean score for body and texture in herbal Shrikhand (8.11) was obtained from the treatment T₃ followed by T₀ (7.84), T₂ (7.79) and T₁ (7.66). The minimum score (7.43) was obtained in T₄. There were significant differences found among the treatments. F Value was 10.884, indicating significant effect of treatment on body and texture.

Flavour and Taste

The highest mean score for flavour and taste in herbal Shrikhand (8.21) was obtained from the treatment T₃ followed by T₂ (7.98), T₀ (7.63) and T₁ (7.58). The minimum score (7.16) was obtained in T₄. There were significant differences found among the treatments. F Value was 15.048, indicating significant effect of treatment on flavour and taste.

Organoleptic Parameters

Table 3: Organoleptic Parameters of Control and herbal Shrikhand

Parameters	Control and herbal Shrikhand					F-Value	C.D.
	T ₀	T ₁	T ₂	T ₃	T ₄		
Colour and Appearance	7.87	7.72	7.92	8.13	7.13	37.519*	0.186
Body and Texture	7.84	7.66	7.79	8.11	7.43	10.884*	0.226
Flavour and Taste	7.63	7.58	7.98	8.21	7.16	15.048*	0.311
Overall acceptability	7.66	7.73	7.90	8.06	7.42	12.956*	1.952

* Significant at 5 % level

** Non-significant at 5 % level

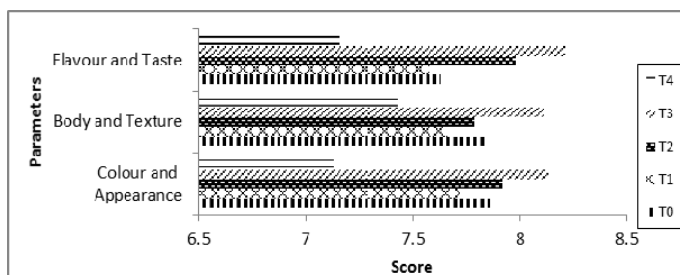


Fig 3: Organoleptic Parameters of Control and herbal Shrikhand.

Overall Acceptability

The highest mean score for overall acceptability in herbal shrikhand (8.06) was obtained for the treatment T₃ followed by T₂ (7.90), T₁ (7.73) and T₀ (7.66). The minimum score (7.42) was obtained in T₄. There were significant differences found among the treatments. F Value was 12.956, indicating significant effect of treatment on overall acceptability.

Cost Analysis of Control and herbal Shrikhand

Table 4: Cost Analysis of Control and herbal Shrikhand

Parameters	Control and herbal shrikhand				
	T ₀	T ₁	T ₂	T ₃	T ₄
Total Cost (Rs/kg)	128.57	129.86	131.14	132.43	133.72

Table 4 shows Cost Analysis of Control and herbal shrikhand. The cost estimated for different treatments are Rs. 128.57, 129.86, 131.14, 132.43 and 133.72 for a kg of sample of T₀, T₁, T₂, T₃ and T₄ respectively by T₄.

Conclusion

Taking the experimental results of the present investigation into considerations, it can be concluded that the Herbal shrikhand prepared by incorporating the 3% basil extract i.e., Treatment 3 (T₃) outlaid the better organoleptic properties viz, Colour and Appearance, Body and Texture, Flavour and Taste and Overall Acceptability followed by treatment 2 (T₂) i.e., with 2% basil extract. The physico- chemical analysis results shows that treatment 4 (T₄) with 4% basil extract possess maximum moisture, protein, ash content, Antioxidant Activity, Acidity and pH while the control sample (T₀) has maximum Total Solids and Fat content. Also, as per FSSAI guidelines, all the nutrients were in prescribed range. The microbial count was found to be within the limit. There was significant difference between and within the treatments.

Conclusion

Taking the experimental results of the present investigation into considerations, it can be concluded that the physico-chemical analysis results shows that treatment 4 (T₄) with 4% basil extract possess maximum moisture, protein, ash content, Antioxidant Activity, Acidity and pH while the control sample (T₀) has maximum Total Solids and Fat content. The microbial count was found to be within the limit. There was significant difference between and within the treatments.

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