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Effect of different nutraceuticals on physico-chemical quality of flavoured milk

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ABSTRACT : The purpose of making flavoured milk is to put skim milk to a profitable use and possesses more nutritive value. Gulkand is a sweet preserve made of rose petals. This is mainly used as an ingredient in pan to add more taste. Gulkand consists of glucose, vitamins etc. It is also having the medicinal value. The microbiological quality of the flavoured milk prepared from Gulkand blended with cow milk was studied. The flavoured milk was prepared from cow milk standardized to three fat levels *viz.*, A_1, A_2 and A_3 as 2, 2.5 and 3.0 per cent, respectively, sugars B_1, B_2, B_3 and B_4 as 5 per cent, 6 per cent, 7 per cent and 8 per cent, respectively, gulkand (C_1) aniseed (C_2) and carrot (C_3) and storage periods 0, 3, 6, 9 and 12 days were used for the preparation of flavoured milk. The effect of various factors on flavoured milk was analyzed for organoleptic qualities (flavour, colour and appearance, sweetness and overall acceptability). The overall acceptability score of flavoured milk was also affected significantly by different nutraceuticals. The maximum (7.16) and minimum (6.70) score were noted in C_1 and C_3 samples, respectively. So far as storage periods of flavoured milk, the highest score (7.81) was noted at zero day storage, while lowest score (6.12) was in D_5 samples.

KEY WORDS : Nutraceutical, Flavoured milk, Gulkand, Saunf, Carrot

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INTRODUCTION

Indian economy dairying has benefited the poor maximum. Out of the 21 per cent GDP of agriculture, 5 per cent is from dairying (Chandramogan, 2006). Milk is nearly perfect food in nature. It supplies body building protein, bone-forming minerals, health giving vitamins and furnishes energy-giving lactose and milk fat. Milk slow down the biochemical processes leading to atherogenesis in rabbits fed on atherogenic diet (Aggarwal and Kansal 1991a; 1991b; 1992; 1993).

The purpose of making flavoured milk is to make milk more palatable to those who do not relish it as such to stimulate the sale of milk, changes in consumer behaviour and to put skim milk to a profitable use. Flavoured milk is gaining popularity day by day because it is a cheaper cold drink than non-milk based drinks and possesses more nutritive value.

Nutraceuticals :

According to American Association of Nutritional Chemists the product that has been isolated or purified from food and generally sold in medicinal forms not usually associated with food named as nutraceutical (Kalra, 2003). The nutraceuticals are natural bioactive, chemical compounds that have health promoting, disease preventing or medicinal properties. Nutraceuticals may

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range from isolated nutrients herbal products, dietary supplements and diets to genetically engineered "designs" foods (Srividya *et al.*, 2010). The various three types of netraceticals were used for preparation of flavoured milk namely aniseed (saunf), carrot and gulkand. Since this drink could be produced from nutraceuticals herb (saunf, gulkand and gajar) has been named nutraceuticals based flavoured milk.

With this perspective in mind and with a view to serve better the interests of beverage industry, the present investigation entitled P entitled effect of different nutraceuticals on physico-chemical quality of flavoured milk was carried out.

MATERIAL AND METHODS

The present investigation was carried out in the Department of Animal Husbandry and Dairying, IAS, Banaras Hindu University, Varanasi, Uttar Pradesh, India. The details of materials and various methods used for manufacture of nutraceuticals based flavoured milk and its analysis in the laboratory. Materials detailed and techniques used are given as under:

Materials :

1) Milk, 2) Skimmed milk, 3) Sugar, 4) Stabilizer, 5) Preservative, 6) Nutraceuticals (Gulkand, Aniseed and Carrot), 7) Flavour.

Methodology :

Procedure for carrot juice preparation:

Fresh and good quality carrots were procured from local market of Varanasi. They were washed in running water, peeled and cut in form of slices and then slices place in the high speed booty mixie for crushing. Then the pulp is squeeze by the muslin cloth and stored in freezer before us (Sharib, 2013).

Procedure for saunf extracts preparation :

The cleaned aniseed (saunf) was soaked in water (water to saunf ratio 3:1) for 5-6 hours at 25-30 °C temperature. The soaked saunf put in the high speed booty mixie for crushing and produced semi dry matter then the matter was squeezed by the muslin cloth. At last the aniseed extract filtered and removed the rest matter from the juice and give clean aniseed extract and take in the glass beaker and store in freezer before use (Shahat *et al.*, 2011).

Preparation of flavoured milk :

Preheating :

Standardized milk was heated to 35 to 40°C in a double packed stainless steel vat with constant stirring by a stainless steel ladle.

Mixing of sugar, gulkand, carrot juice, aniseed extracts, stabilizer and preservative.

To prepare the nutraceutical based milk the following formulations were used :

- Gulkand, carrot juice and aniseed extract 5-7 per cent by w/v of milk.
- Sugar 5, 6, 7 and 8 per cent by w/v of milk.
- Stabilizer-sodium alginate- 0.2 per cent by w/v of milk.
- Preservative- sodium bi carbonate@ 2.5 per cent by w/v of milk.

To prepare nutraceuticals based flavoured milk containing 5 per cent, 6 per cent, 7 per cent and 8 per cent sugar, 50, 60, 70 and 80 g of sugar per lit of milk was dissolved in some amount of warmed milk. The required amount of gulkand, carrot and aniseed extract at the rate of 50 and 70 g per lit of milk was taken and made a homogenous liquid with 50 ml warmed milk and mixed well. Like sugar, Nutraceuticals (gulkand, carrot juice and aniseed extract) and 2 g of sodium alginate was weighed separately and transferred to a beaker to make a solution with 100 ml warmed milk (35- 40 °C) and heated until the sodium alginate was completely dissolved in the milk and mixed well in the boiling milk with constant stirring.

Pasteurization :

After through mixing, the milk was heated at temperature of 71°C for 30 minutes, cooled to 25°C. Immediately after manufacturing, the products was filled in 200 ml glass bottles which were properly cleaned and sterilized before filling the bottles and sealed with crown cork using corking machine. All bottles were sterilized in a autoclave at a pressure of 15 Ibs/inch at a temperature of 121°C for 15 minutes and transferred for storage at refrigeration temperature (5 to 10°C) for various length of time to observe its period and analysis for various parameters. Flavoured milk was prepared by adopting the procedure as given in the Fig A.

Statistical analysis :

In order to study the effect of different levels of fat,

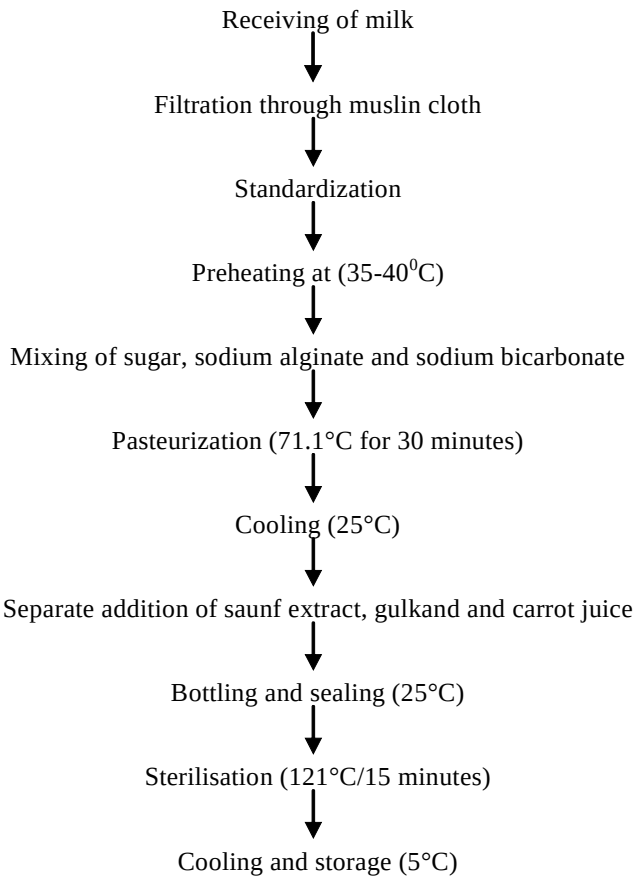

Fig. A: Flow diagram of manufacture of nutraceuticals based flavoured milk

sugar, gulkand, carrot juice, and aniseed extract and storage periods on different character of flavoured milk, the data regarding physico-chemical and microbial quality of nutraceutical based flavoured milk, a laboratory experiment was conducted and desired data were collected. Analysis of variance of these data was worked out on the basis of Factorial Completely Randomized Design (Gupta and Kapoor, 2007).

Treatment details :

Fat levels *viz.*, A_1, A_2 and A_3 as 2, 2.5 and 3.0 per cent, respectively, sugars B_1, B_2, B_3 and B_4 as 5 per cent, 6 per cent, 7 per cent and 8 per cent, respectively, gulkand flavour (C_1), aniseed extract (C_2) and carrot juice (C_3) and storage periods 0, 3, 6, 9 and 12 days as D_1, D_2, D_3, D_4 and D_5.

RESULTS AND DISCUSSION

The result obtained during the present investigation as effect of different neutraceuticals on physic-chemical properties of flavoured milk.

Sensory evaluation :

Flavour :

The flavour of flavoured milk is the most important quality attributes. A pleasant sweetish aroma should be maintained for a long storage period.

The effect of different nutraceuticals (C) on flavour score of flavoured milk revealed a highest score (7.26) on addition of gulkand flavour (C_1) followed by aniseed extract (C_2), while lowest score (6.79) was noted in case of carrot juice (C_3) samples (Table 1). It was also observed that gulkand added samples were significantly superior over that of aniseed extract and carrot juice added samples.

By comparing the average flavour scores of nutraceuticals based flavoured milk on account of different storage periods (D), it was observed that fresh samples D_1 scored the maximum(7.91) followed by D_2, D_3 and D_4, while D_5 scored the minimum (6.20). The mean

Table 1 : Effect of nutraceuticals (C) and storage periods (D) on flavour score of nutraceuticals based flavoured milk

	D_1	D_2	D_3	D_4	D_5	Mean
C_1	8.12	7.65	7.25	6.84	6.45	7.26
C_2	7.91	7.45	7.00	6.64	6.20	7.04
C_3	7.70	7.22	6.71	6.37	5.96	6.79
Mean	7.91	7.44	6.99	6.62	6.20	

Table 2 : Effect of nutraceuticals (C) and storage periods (D) on colour and appearance score of nutraceuticals based flavoured milk

	D_1	D_2	D_3	D_4	D_5	Mean
C_1	8.02	7.55	7.15	6.74	6.35	7.16
C_2	7.81	7.35	7.06	6.54	6.11	6.98
C_3	7.60	7.12	6.61	6.27	5.86	6.69
Mean	7.81	7.34	6.94	6.51	6.11	

differences of flavour scores varied significantly when compared with CD at 5 per cent. The flavour score decreased with increase in storage period may be due to bacterial decomposition. The present finding collaborates with the findings of Vijaylakshmi and Tamilarasi (2001) who reported that the product showed a decreasing trend during storage.

Colour and appearance :

The colour of flavoured milk should be pleasing attractive and uniform without showing any sign of visible foreign matter. The colour of flavoured milk was yellowish, pinkish and creamy white. The fat deposition should not be on top neck of the bottle. Flavoured milk should have uniform liquidity of appearance. The colour and appearance of flavoured milk as affected by different factors has been presented in Table 2.

The effect of different nutraceuticals (C) on colour and appearance score of flavoured milk revealed a highest score (7.16) on addition of gulkand flavour (C_1) followed by aniseed extract (C_2), while lowest (6.69) was noted in case of carrot juice (C_3) samples. It was also observed that gulkand added sample was significantly superior to aniseed extract and carrot juice added samples.

By comparing the average colour and appearance scores of flavoured milk on account of different storage periods (D), it was observed that fresh samples scored the maximum (7.81) followed by D_2, D_3 and D_4, while minimum score (6.11) in case of D_5 samples.

The present findings corroborates with the findings of Vijaylakshmi and Tamilarasi (2001)who reported that the product showed a decreasing trend in sensory quality during storage.

Sweetness :

The flavoured milk contains less sugar than other dairy foods. The excessively sweetness should be avoided. The best sugar content of the flavoured milk is 45-55 per cent. The highest score (7.06) was found in samples containing gulkand (C_1) followed by aniseed extract (C_2) and carrot juice (C_3). So far as the storage periods are concerned, the fresh samples contained the maximum score (7.71) followed by D_2 (7.25). The minimum score (6.01) was observed when samples were store for 12 days (D_5). An inverse relationship between sweetness scores and storage periods was also observed which may be due to bacterial decomposition. These findings closely agreed with the finding of Vijaylakshmi and Tamilarasi (2001) who reported that the product showed a decreasing trend during storage (Table 3).

Overall acceptability :

The overall acceptability scores on account of various treatment combinations were presented in Table 4. The overall acceptability score as influenced by nutraceuticals (C) exhibited maximum overall acceptability score (7.16) when treated with gulkand flavour (C_1) followed by aniseed extract (C_2) (6.98) while carrot juice scored the least (6.70) statistically these values differed significantly when compared with CD at 5 per cent. The gulkand added samples were significantly superior over aniseed extract and carrot juice added samples. The overall acceptability scores due to storage days, irrespective of other parameters, showed a decreasing trend from 7.81, 7.34, 6.95, 6.51 and 6.12 on zero to 12 days storage. The maximum (7.81) score was noted when product was fresh and minimum (6.12) after 12 days storage. The storage days differed significantly within treatments.

Table 3 : Effect of nutraceuticals (C) and storage periods (D) on sweetness score of nutraceuticals based flavoured milk

	D_1	D_2	D_3	D_4	D_5	Mean
C_1	7.92	7.45	7.05	6.65	6.25	7.06
C_2	7.71	7.27	6.96	6.44	6.01	6.88
C_3	7.50	7.02	6.48	6.17	5.76	6.59
Mean	7.71	7.25	6.83	6.42	6.01	

Table 4 : Effect of nutraceuticals (C) and storage periods(D) on overall acceptability score of nutraceuticals based flavoured milk

	D_1	D_2	D_3	D_4	D_5	Mean
C_1	8.05	7.55	7.14	6.73	6.35	7.16
C_2	7.81	7.35	7.06	6.54	6.11	6.98
C_3	7.59	7.12	6.62	6.27	5.89	6.70
Mean	7.81	7.34	6.95	6.51	6.12	

The results also indicated that overall acceptability scores decreased with increase in storage days, which may be due to bacterial decompositions. The findings fall in line of Vijaylakshmi and Tamilarasi (2001) who reported that the product showed a decreasing trend during storage. Nadaf *et al.* (2012) showed that on the basis of various sensory parameters, Shrikhand containing 2:1.5 g of gulkand and dried rose petal powder was most liked by panel members and hence, further examined for storage efficiency. On the basis of sensory evaluation and microbial analysis the product was acceptable for a period of 21 days under refrigerated temperature. Notarj (1985) reviewed the effect of processing techniques and storage condition of the physico-chemical, microbiological and sensory evaluation of sterilized chocolate milk formulation. The author also observed that during storage period microbial count of sterilized chocolate milk increase one per ml initially and 5613 to 3589 per ml after 56 days at room temperature and 5 to 10°C, respectively. General acceptability scores decreased correspondingly from 8.3 and 8.3 initially 7 (slightly acceptable) and 8 (moderately acceptable). Kriel (1979) observed that the chocolate milk beverage made from the 3:1 mixture of whey and milk was highly acceptable to a taste panel, whereas, the product made from 100 per cent whey was considered to have a watery taste and to dark a colour. An effect of different level of gulkand on chemical composition and organoleptic quality of ice-cream revealed that the different level of had significant effect on total solids and solid not fat content in ice-cream sample. The difference in flavoure scores for various levels of gulkand was significant ($P<0.05$, Ahire *et al.*, 2008). The research was carried out to utilize the whey by the Development of Whey Based Mango Herbal (Cardamom) Beverage (Choudhary *et al.*, 2008). Pakalwad (2008) showed that the papaya milk shake was prepared from different proportions of papaya pulp (%) and milk shake (%) by weight. So incorporation of 10 per cent papaya pulp (T_1) in milk shake was found to be highly acceptable. With the increase in concentration of papaya pulp sensory score for overall acceptability decreased.

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