

Original Research Article

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Standardization and Quality Evaluation of Spray Dried Flavored *Lassi* Powder

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ABSTRACT

Keywords

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The present study was planned to prepare the flavored *lassi* with the blending of buttermilk and soymilk at different concentrations and the prepared product has been evaluated by trained judges on the basis of 9 point Hedonic scale. The prepared product was evaluated for its color and appearance, flavor, body and texture, taste and overall acceptability of the final product. The flavored *lassi* prepared 70% buttermilk and 30% soymilk with addition of sugar (15%) and mango pulp (5%) got the highest overall acceptability by the panel members than other treatments. Then the flavored *lassi* was spray dried for preparation of powder. Results obtained from nutritional quality of *lassi* powder have been proven that *lassi* powder is rich source of vitamin A and minerals like calcium, phosphorus. Reconstitution properties of prepared *lassi* powder were found to be best.

Introduction

Milk is the most wholesome single food available in nature for health and medicine, which has never been debated. It is rich in nutritive value and important source of food for human. Milk is the most precious liquid food in nature and supplies body building

proteins, bone forming minerals, health giving vitamins and energy giving lactose and milk fat. India has highest milk production in the world i.e.121.8 million tones with per capita availability of 281 gm/day (GOI, 2012). A fermented milk product also known as cultured dairy foods. The cultured dairy products or cultured milk products are dairy

foods that have been fermented with lactic acid bacteria such as *Lactobacillus*, *Leuconostoc* and *Lactococcus* fermentation process, which increases the shelf life product as well as add the taste and improves the digestibility of milk. About 9% of the total milk produced in India is converted into fermented milk products (Singh, 2007).

Lassi is a fermented beverage generally made from curd obtained by lactic acid culture to which sugar or salt are added. *Lassi* is a popular and traditional yoghurt based drink which is originated in Punjab region of the Indian sub-continent. It is made by blending yoghurt with water, salt, pepper, ice and Indian spices. *Lassi* is taken cold and is a good way to beat the scorching heat and get refreshed. In addition, it is considered to be a healthy drink. *Lassi* is one of the finest, unique and refreshing summer coolants. A plain *lassi* is just made by thick curd or yoghurt, salt or sugar, ice cubes and water. *Lassi* can be customized in any way you like by adding tropical fruits such as mango, strawberries etc, to enhance the flavor and taste and making it refreshing and delightful. Excellent quality *lassi* can be produced by blending *lassi* with 20% pomegranate juice had lowest juice (Avtade *et al.*, 2010). The production of *lassi* has been confined, to a large extent, to the households and local halwais mainly because of non-availability of a standardized technique for the manufacture of uniform quality *lassi* and its limited shelf life. In 1972 the technology was standardized at National Dairy Research Institute, Karnal and regular production of *lassi* started. Blended *lassi* was prepared from soya milk of two varieties of soyabean, Pratishta (MAUS-61-2) and Sumrudhi (MAUS-71), with skim milk powder (SMP) and buffalo milk (BM). Both the soyabean varieties were found suitable for soya milk blended *lassi*. (Kadam *et al.*, 2005, 2006)

The major byproducts of the dairy industry are skim milk, buttermilk and whey. Buttermilk is one the products of the dairy drinks. Originally buttermilk was the liquid left behind after churning butter out of cream. Buttermilk controls the vitiation of all three and is nutritive, freshening and appetizing in action. It is highly acclaimed medicine for diarrhea, dysentery, chronic specific and non-specific colitis, piles and jaundice and also in conditions where liver and spleen dysfunctions are involved. Buttermilk has been used in gastrointestinal upsets since time immemorial (Anon, 2003). Buttermilk is good dietary source of calcium not only because of its high calcium content, but also because calcium becomes solubilized due to the acidic pH thus improving the bio-availability. Buttermilk is reported to be containing more latent "taurine" than the milk or curd itself (Balsubramanya, 2002).

Soybean is the concentrated source of vegetable proteins. It contains generally about 40% protein. Soybean has occupied a unique position in the diet of Indian population. It can be processed to produce a texture and appearance similar to many other foods. For example, soybeans are the primary ingredient in many dairy product substitutes e.g., soy milk, margarine, soy ice cream, soy yoghurt, soy cheese and soy cream cheese. Soymilk may play a more important role in keeping the heart healthy than bovine milk (Odo, 2003; U. S. Soyfoods Directory, 2007). Soymilk has a great potential to supplement the dairy milk and its nutritional comparability with mother milk and cow milk. Soymilk has been advocated as a low cost high protein beverage suitable for developing countries. Recipes from freshly extracted soymilk like ice-cream, *kalakand*, and pudding, soy *channa* and *kadhi* and *shrikhand* from soy curd were prepared. Soymilk is being free from cholesterol, gluten and lactose. Soymilk is a suitable food for lactose-intolerant consumers, vegetarians and

milk allergy patients (Liu and Lin, 2000). Soymilk is promoted as a healthy alternative to cow or buffalo milk. It has diabetes management ability to control blood sugar levels, source of lecithin and vitamin E, but lack in casein. The iron content of soymilk is 12 times higher than that of bovine and human milk, and so it is effective in treating anemia (Odo, 2003; Fehily, 2003). It is also safe for people with milk allergy. Also soymilk contains isoflavones and organic chemicals which are beneficial to health. Soymilk may play a more important role in keeping the heart healthy than bovine milk (U.S. Soy foods Directory, 2007).

Materials and Methods

The fresh buffalo milk was obtained from the local market. The milk was used for preparation of buttermilk. Soybeans, sugar, mango pulp and guar gum were procured from local market.

Preparation of buttermilk

A good quality buffalo milk was standardized to fat (6%) heated to about 85⁰C for 15 min, immediately cooled to 40⁰C and inoculated with starter culture (lactic acid bacteria, *Streptococcus thermophilus*, *Lactobacillus bulgaricus*, *Streptococcus lactis* and *Streptococcus diacetylactis* 1-2 %). Then it was incubated at room temperature for about 12 -14 h, till the desired acidity in the curd was obtained.

The curd was then churned by using traditional churner. Simultaneously desired temperature of about 50⁰F was maintained by adding required quantity of pasteurized chilled water and the butter was collected from the surface and the remaining liquid was collected as buttermilk. It was passed through cream separator to remove residual butter or fat.

Preparation of soy milk

Soymilk was prepared as per the procedure given by Srilakshmi (2003). It was prepared by soaking beans in (0.5%) sodium bicarbonate solution at room temperature for overnight. The soaking solution was three times of weight of clean soybean taken. Then the soaked water was drained and beans was blanched in fresh water for 30 min. The hulls were then removed by rubbing. The dehulled beans were grained with hot water in mixer and diluted finally to 1:6 ratios on dry basis. The wet mass was cooked for 20-25 min at 100⁰C and filtered through three folds of muslin cloth.

Preparation of dahi

Dahi was prepared by using following procedure given by De (2006). The buttermilk was taken which was obtained from buffalo milk. The prepared milk was preheated (35-40⁰C) and standardized. The soymilk prepared from soybean was preheated at 35-40⁰C and stand. Both milks were then mixed together according to the treatment combination. This mixture was then heated to 80 - 90⁰C. Then it was allowed to cool up to 20 - 30⁰C. The previously prepared *dahi* was added in the mixture as culture at the rate of one to two tablespoon. The mixture was incubated at room temperature for 10-12 h and *dahi* was obtained.

Preparation of Lassi

Lassi was prepared by using following procedure given by De (2006). The prepared *dahi* as per the treatment combination was taken separately and continuously stirred. The grinded sugar was added in *dahi* at the rate of 13 – 15%. Then *dahi* was continuously stirred again for the proper mixing of sugar and to break the lumps. The mango pulp was added at the rate of 5%. The prepared *lassi* was been

filled in bottles or pouches and stored at refrigerated temperature.

Treatments for *lassi*

For preparation of flavored *lassi* following blends of buttermilk and soymilk were used.

A = 100 % buttermilk (Control)

B = 80 parts of buttermilk + 20 parts of soymilk

C = 70 parts of buttermilk + 30 parts of soymilk

D = 60 parts of buttermilk + 40 parts of soymilk

Preparation of flavored *lassi* powder

The flavored *lassi* is prepared as per procedure and flavored *lassi* powder is prepared by using spray drier.

Results and Discussion

Physico-chemical characteristics of buttermilk and soymilk

The Physico-chemical characteristics of buttermilk and soymilk were presented Table 1.

The pH of buttermilk and soymilk were 4.82 and 6.60 respectively. The pH of buttermilk was less as compared soymilk because of its increased acidity. i.e. conversion of lactose into lactic acid. The specific gravity of buttermilk is lower than soymilk because of the lower total solid content. The buttermilk was found to contain moisture (91.2%), total solids (8.8%) fat (0.2%), protein (3.4%), total carbohydrate (4.5%) and ash (0.7%). The soymilk was found to contain moisture (89.8%), total solids (10.2%) fat (1.82%), protein (3.74%), total carbohydrate (3.7%) and ash (0.94%). The lactose content of buttermilk was found to contain 4.2%

whereas soymilk is lactose free. The result was good accordance with data of De (2006). The SNF content of buttermilk is 8.76%. The viscosity of soymilk was found to contain 12 cp. The soymilk was found to contain higher amounts of chemical constituents than buttermilk.

Sensory evaluation of flavored *lassi*

The panel of 10 trained judges was given samples for evaluation of flavored *lassi* prepared with various combinations of buttermilk and soymilk. The sensory qualities viz. color and appearance, flavor, body and texture, taste and overall acceptability were evaluated. It was served to judges on the day of preparation of *lassi*. The average score of flavored *lassi* recorded by judges were presented in Table 2.

A flavored *lassi* prepared from composite blends of soymilk and buttermilk was within acceptable range. The sample C scored higher for all sensory parameters than other treated sample.

Sensory evaluation of flavored *lassi* powder

In order to meet the seasonal and regional requirements of *lassi*, a technology has been developed for the manufacture of *lassi* powder, which upon reconstitution yields *lassi* like beverage. The curd is broken by agitation to obtain smooth slurry, which is subsequently spray dried under predetermined conditions. Sugar is dry blended. The powder on reconstitution with water yields *lassi*-like beverage. The acceptability of beverage could be enhanced by fortification with fruit juices. A dry *lassi* powder is highly desirable because of long shelf-life, low transportation cost, storage capacity and the product can be distributed over a wide area. Thus, a process for producing a dried *lassi* powder which is soluble and without loss of nutritive value is

highly desirable. The panel of trained judges of 10 members was given samples for evaluation of selected flavored *lassi* powder (Sample C) sensory qualities viz. color and appearance, flavor, body and texture, taste and overall acceptability. It was served to judges on the day of preparation of *lassi*. The average score recorded by judges was presented in Table 3.

Physico-chemical characteristics of flavored *lassi* powder

The flavored *lassi* powder from sample C scored higher for all sensory parameters was analyzed for physico-chemical characteristics. The results obtained are depicted in Table 4.

The bulk density of flavored *lassi* powder was 0.3637 g/mL. The yield of *lassi* powder was 15%. The moisture content of flavored *lassi* powder was decreased because of small droplet size and high inlet temperature which led to maximum evaporation of moisture. The protein, fat, carbohydrate and ash content of prepared flavored *lassi* powder were found 37.8, 13.6, 40.2 was 4.9 and respectively. The color, particle size and titrable acidity of flavored *lassi* powder was found as 5Y 8/6, less than 150 μm . and 1.08% respectively.

Nutritional quality of flavored *lassi* powder

The flavored *lassi* powder of sample C, scored higher for all sensory parameters was prepared and was analyzed for its nutrient content. The results obtained are depicted in Table 5.

The flavored *lassi* powder was found to contain calcium, vitamin A and phosphorus 280.85 (mg/100g), 92.57 (IU/100g) and 237.39 (mg/100g) respectively.

Reconstitution properties of flavored *lassi* powder

The reconstitution properties of *lassi* powder are presented in Table 6.

The *lassi* powder prepared from flavored *lassi* showed good reconstitution properties as water solubility index was found in the range of 92-97%, wettability and sinkability was ranged from 85-95% and 80-85%. The dispersability of *lassi* powder ranged from 90-95%. The *lassi* powder prepared was dispersed easily in water and having good wettability.

Flow sheet.1 Preparation of *lassi* powder

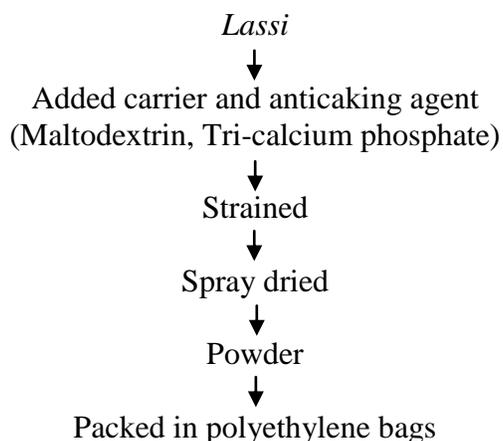


Table.1 Physico-chemical characteristics of buttermilk and soymilk

Parameters	Buttermilk	Soymilk
pH	4.82	6.60
Acidity (%)	0.50	0.17
Specific gravity	1.015	1.055
Moisture (%)	91.2	89.8
Total solids (%)	8.8	10.2
Fat (%)	0.2	1.82
Protein (%)	3.4	3.74
Total carbohydrate (%)	4.5	3.70
Ash (%)	0.7	0.94
Lactose (%)	4.2	Nil
SNF (%)	8.76	-
Viscosity (cp)	-	12

Table.2 Sensory evaluation of flavored *lassi*

Sample	Color and appearance	Flavor	Texture	Taste	Overall acceptability
A (Control)	9	8.5	8	9	8.5
B	8	8	8	8	8
C	8.5	8	8.5	8.5	8.5
D	7	7	7	7	7
SE±	0.033	0.033	0.026	0.028	0.028
CD at 5%	1.085	1.085	0.085	0.093	0.093

Table.3 Sensory evaluation of flavored *lassi* powder

Sample	Color and appearance	Flavor	Texture	Taste	Overall acceptability
A (Control)	7.5	8	7	8.5	8.5
C	7	7.5	6.5	8	8
SE±	0.057	0.02	0.057	0.023	0.017
CD at 5%	2.263	1.13	2.26	0.095	0.067

Control - *lassi* prepared from control *lassi* powder; C -*lassi* prepared from sample C.

Table.4 Physico-chemical characteristics of flavored *lassi* powder

Parameters	Value
Bulk density(g/mL)	0.3637
Particle density (g/cm ³)	1.66
Yield (%)	15
Moisture (%)	3.5
Fat (%)	13.6
Protein (%)	37.8
Carbohydrate (%)	40.2
Ash (%)	4.9
Color	5Y 8/6
Particle size (µm)	< 150
Titrateable acidity (%)	1.08

Table.5 Nutritional quality of flavored *lassi* powder

Nutrients	<i>Lassi</i> powder
Calcium (mg/100g)	280.85
Vitamin A (IU/100g)	92.57
Phosphorus (mg/100g)	237.39

Table.6 Reconstitution properties of flavored *lassi* powder

Parameters	Temperature			
	10 °C	20 °C	30 °C	40 °C
Water solubility index (%)	90	92	95	97
Wettability (%)	85	88	90	95
Sinkability (%)	80	82	85	88
Dispersibility (%)	90	92	94	96

From the present investigation it can be concluded that, an acceptable low cost flavored *lassi* powder can be prepared by using soymilk blended with buttermilk can be prepared with addition of sugar (15%) and mango pulp (5%). Due to low cost of blended flavored *lassi* it could have a good market potential. Among the four treatments, treatment C was found to be more acceptable with respect to mentioned quality parameters. The assessed techno-economic feasibility of prepared product shows to obtain more

profits, with in lesser budgets. So techno-economically it may prove boom, which will open an avenue for *lassi* market.

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