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Standardization and Physico-Chemical Properties of Custard Apple Soya Milk Shake

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A B S T R A C T

Soya milk was used as alternative of cow and buffalo milk due to problems with intolerance and allergy. Soya milk shake was prepared from different proportions of soya milk standardized with cardamom essence and custard apple pulp i.e. (T_1) 95:05, (T_2) 90:10 and (T_3) 85:15. The overall acceptability of custard apple milk shake of treatments T_1, T_2 and T_3 were 8.16, 8.35 and 7.65, respectively determined by sensory evaluation. It was observed that the custard apple soya milk shake prepared from 90 parts of soya milk and 10 parts of custard apple pulp i.e. treatment T_2 was more acceptable than other treatments and ranked between like very much to dislike very much. The products were analysed for physico-chemical properties likewise TSS, viscosity, Specific Gravity, pH, acidity, protein, fat, total sugar and ash.

Introduction

The demand for alternatives to dairy products is growing due to problems with intolerance and allergy, desire for vegetarian alternatives and so on and hence the interest in soya-based foods has developed. Soya milk is one of the popular traditional products in China and other Asian countries consumed as a nutritious and economical protein food. Consumers preferred soya milk mainly as an important replacer of cow milk due to lactose intolerance or allergic reaction to cow's milk and as a low cost source of good quality protein and energy. They contain no cholesterol and little or no saturated fat (Jooyandeh, 2011). Recent advancements in science has resulted several soya milk products. It is essentially a water extract of soybeans, and contains all of the components of the bean, except for some insoluble fiber removed during processing called okara (Kwok and Niranjan, 1995; Mullin *et al.*, 2001; Akintunde and Akintunde, 2002; Lakshmanan *et al.*, 2006). Soya milk composition varies depending on processing conditions and bean variety and in general contains about 8-10% total solids, 3.6% protein, 2.0% fat, 2.9% carbohydrates and 0.5% ash (Liu, 1997). Soya milk shake is obtained by freezing a mix very similar to soft serve ice cream mix and speedy mixing of the

frozen product to make it pourable and generate foam in it.

Blending soya milk with different fruits to formulate tasty and palatable products is gaining importance. Custard apple (*Annona squamosa* L.) is popularly called as sitaphal in South India and sharifa in North India. A considerable portion of the produce goes waste because of lack of primary processing and other factors.

Custard apple is rich in carbohydrates and good source of proteins and minerals like calcium, phosphorus and iron. Its calorific value ranges from 822 to 1050 kcal per kg as compared with 741 kcal per kg of mango (Rao, 1974). Custard apple is considered as one of the delicious and nutritionally valuable fruit. It contains about 28-55% of edible portion consisting of 73.30% moisture, 1.60% protein, 0.30% fat, 0.70% mineral matter, 23.90% carbohydrates (Nissen *et al.*, 1988). The both soya milk and custard apple pulp are easy to digest and they can be consumed easily by children and people of all ages (Kirtikar and Basu, 1955; Jooyandeh, 2011). So, an attempt was made to prepare soya milk shake blended with varying amount of custard apple pulp. The sensory and Physico-chemical characteristics of the finished product were also studied.

Materials and Methods

All the raw materials i.e. soyabean, custard apple, sugar & cardamom essence were purchased from local market of Sangamner, Dist- Ahmednagar. Soya milk was extracted and standardized with 0.5% cardamom essence. The pulp was extracted by fruit and stored at 15-20°C temperature. The stabilizing agent such as sodium alginate was used as stabilizer. The custard apple soya milk shake was prepared as per the method described by Poul *et al.,* (2009) with slight modification. The physic-chemicals properties of final product were determined in Food Chemistry and Nutrition laboratory of Shramshakti college of Food Technology, Maldad.

Product treatments

The custard apple soya milk shake, blends of soya milk and custard apple pulp were as follows.

T_1 95 part of soya milk + 05 part of custard apple pulp
T_2 90 part of soya milk + 10 part of custard apple pulp
T3 85 part of soya milk + 15 part of custard apple pulp

Preparation of soya milk

The soybeans were cleaned to remove dirt's and impurities. Water was added to the beans in the ratio of 1.3 (beans to water) and the beans were allowed to soak for 10 hrs. After 10hrs drained and the soybeans were then dehuled and the chaff removed by adding water and decanting. Milling was done using a mixture. About 3 parts of water was added to the slurry and 0.5% cardamom essence was added. The mixture was allowed to pasteurized at 68°C for 30 min. It was then bottled while still hot and allowed to cools as per the method described by Oloye (2014).

Preparation of custard apple pulp

Good quality fully eye opened, ripened but firm fruits having uniform green colour, with creamy whitish pulp and pleasant flavour were selected. After washing manual peeling was done, the pulp and seeds were separated by rubbing the pulpy seeds on stainless steel wire mesh. The pulp was filtered through muslin cloth. Then pulp was pasteurized at 85°C for 30 min and packed in high density polythene pouches. The pulp was stored at

15-20°C temperature in refrigerator for 2 hrs. and used after addition of sodium alginate as per method described by Poul *et al.,* (2009).

Preparation of custard apple soya milk shake

Custard apple soya milk shake was prepared as per method described by Sharma and Gupta (1978) with slight modification. It is shown in (fig 1).

Sensory evaluation

The sensory quality of product was evaluated by a panel of 10 judges selected from the staff of Department of Food Science and Technology, Food Chemistry and Nutrition, Food Engineering and Food Microbiology of Shramshakti College of Food Technology, Maldad, using 9 point Hedonic scale as described by Ranganna (1999).

Physico-chemical analysis

Physical properties

TSS of custard apple soya milk shake was determined with the help of Erma hand refractometer described in A.O.A.C. (1990). Specific gravity and density by specific gravity bottle method described in A.O.A.C. (1990), Viscosity determined as per Ostwald's viscometer method described by Ranganna (1999), and pH was measured using digital pH meter.

Chemical analysis

Protein content of custard apple soya milk shake was determined by micro-Kjeldhal method described in Ranganna (1999), fat content by Gerber's method described in FSSAI (2015), Total sugar determined as per phenol-sulphuric method described in Thimmaiah (2012). Ash and titratable acidity was determined by ISI (1961).

Results and Discussion

Sensory evaluation of custard apple milk shake: The soya milk shake fortified with different proportion of custard apple pulp were subjected to sensory evaluation for overall acceptability i.e. colour and appearance, flavour, taste and consistency by trained judges, through 9 point hedonic scale and is presented in table 1.

The mean score for colour and appearance of different treatments of custard apple soya milk shake i.e. T1, T_2 and T_3 were 8.22, 8.25 and 8.14, respectively. Treatment T_2 got highest score as compared to treatment T_1 and T_3. In a treatment T_2 contained 10 per cent of custard apple pulp which was increase the colour and appearance of the soya milk shake. There were slight differences amongst all treatments for colour and appearance score.

Score for the flavour of treatment T_1, T_2 and T_3 were 7.72, 7.91 and 8.00, respectively. The height score for flavour was T_3 and lowest score T_1. The hedonic scale were ranked between like very much to dislike very much. It was observed above findings, if increased the percentage of custard apple pulp in the blend, the flavour of soya milk shake also increased. Changes of product flavour may be due to pleasant flavour of custard apple pulp which enhanced the flavour of soya milk shake.

Taste score for treatment T_1, T_2 and T_3 was 8.10, 8.40 and 7.22, respectively. The taste of treatment T_2 was most acceptable as compared to treatment T_1 and T_3. In a treatment T_2 got acceptable taste of custard apple by sensory panel member.

Score for the consistency of treatment T_1, T_2 and T_3 were 8.18, 8.51 and 7.01, respectively. Consistency of treatment T_2 was better than other treatments. If increases the percentage

of custard apple pulp beyond 10 per cent in blend, also increased consistency of product and decreased the score.

The mean score for overall acceptability of custard apple soya milk shake of treatment T_1, T_2 and T_3 were 8.16, 8.35 and 7.65 respectively. Treatment T_2 got highest score for overall acceptability by judges due to it colour, flavour and consistency. Therefore treatment T_2 was most acceptable. So, blending of 10 per cent custard apple pulp for soya milk shake was more acceptable than others.

Physico-chemical evaluation

Physical properties: Physical properties of treatment T_1, T_2 and T_3 were studied and is shown in table 2.

TSS: The TSS content of custard apple soya milk shake was determined with the help of Erma hand refractometer. The prism of refractometer was washed with water and wiped dry after each reading of treatments and maintained up to 16° brix to each treatment.

Viscosity: Viscosity was determined by Ostwald's viscometer method. The viscosity of treatment T_1, T_2 and T_3 were 5.67 cp, 8.18cp and 13.58cp, respectively. The viscosity of treatment T_2 (8.18cp) was higher than treatment T_1 (5.67cp) and less than treatment T_3 (13.58cp). It was observed that as the part of custard apple pulp increased with also increases viscosity of product.

Table.1 Score for overall acceptability of custard apple soya milk shake

.Treatment	Colour and appearance	Flavour	Taste	Consistency	Overall acceptability
T_1	8.22	7.72	8.10	8.18	8.16
T_2	8.25	7.91	8.40	8.51	8.35
T_3	8.14	8.00	7.22	7.01	7.62

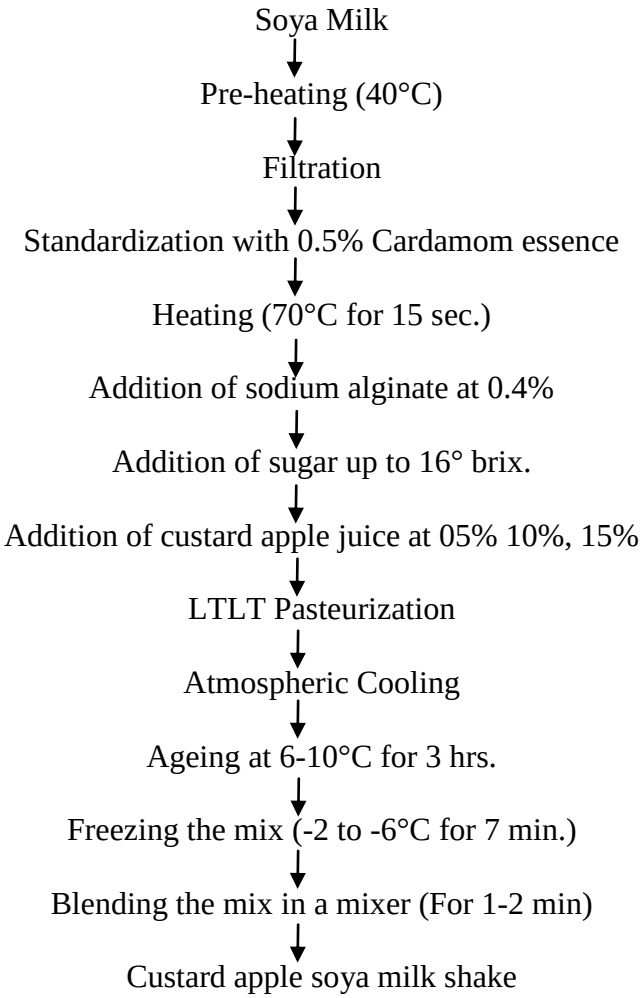
Table.2 Physical properties of custard apple soya milk shake

Treatment	TSS (° Brix)	Viscosity (cp)	Specific gravity	Density (gm/ml)	pH (%)
T_1	16	5.67	1.0624	1.1364	6.30
T_2	16	8.18	1.0626	1.1366	6.27
T_3	16	13.58	1.0628	1.1368	6.25

Table.3 Chemical composition of custard apple soya milk shake

Treatment	Protein (%)	Fat (%)	Total sugar (%)	Ash (%)	Acidity (%)
T_1	3.85	1.6	15.75	0.72	0.14
T_2	3.50	1.2	16.92	0.75	0.16
T_3	2.80	1.0	18.04	0.88	0.17

Fig.1 Flow diagram for preparation of custard apple soya milk shake



Specific gravity: Specific gravity was determined by specific gravity bottle method. The specific gravity for treatment T_1, T_2 and T_3 were 1.0624, 1.0626 and 1.0628, respectively. The specific gravity of custard apple soya milk shake was recorded highest in T_3 (1.0628) and lowest in T_1 (1.0624). It was observed that as the incorporation of custard apple pulp increased with increase specific gravity of finished product.

Density: Density of treatment T_1, T_2 and T_3 were 1.1364, 1.1366 and 1.1368 gm/ml, respectively. Treatment T_3 (1.1368gm/ml) had highest value than T_1 (1.1364gm/ml) and T_2 (1.1366gm/ml). It was observed that, the proportion of custard apple pulp was increased with increase the density of finished product.

pH: The pH value of treatment T_1, T_2 and T_3 were 6.30, 6.27 and 6.25 percent, respectively. The pH of custard apple soya milk shake was highest in treatment T_1 as compared to others. The reading shows that, the incorporation of custard apple pulp was increased with decrease the pH of finished product.

Chemical composition: Chemical composition of custard apple soya milk shake prepared from different parts of soya milk and

custard apple pulp i.e. treatment T_1, T_2 and T_3 were studied and is shown in table 3.

Protein: The protein content of custard apple soya milk shake for treatment T_1, T_2 and T_3 was 3.85, 3.50 and 2.80 percent, respectively. The protein content was highest in treatment T_1 (3.85%) and lowest in treatment T_3 (2.80%). It was observed that as the proportion of custard apple pulp in the blend increased there was decrease in the protein content, which might be due to less protein content in custard apple pulp as compared to soya milk.

Fat: The fat content of treatment T_1, T_2 and T_3 was 1.6, 1.2 and 1.0 percent, respectively. Treatment T_1 content was highest fat as compared to other. The reading shows that as the addition of custard apple pulp was increased the fat content of product decreased. This might be due to low fat content in custard apple pulp as compared soya milk.

Total Sugar content: The total sugar content in treatment T_1, T_2 and T_3 were 15.75, 16.92 and 18.04 percent, respectively. Treatment T_3 (18.04%) content was more than sugar as compared T_1 (15.75%) and T_2 (16.92%). It was observed that, the proportion of custard apple pulp was increased with increased sugar content in custard apple soya milk shake. This might be due to higher sugar content in custard apple pulp.

Ash content: The ash content in custard apple soya milk shake for treatment T_1, T_2 and T_3 were 0.72, 0.75 and 0.88 percent, respectively. The ash content of treatment T_3 was higher as compared other. It was observed that as the ash content of finished product increased with increase incorporation of custard apple pulp.

Acidity: The acidity of treatment T_1, T_2 and T_3 was 0.14, 0.16 and 0.17 percent, respectively. There was slight difference between treatments. The data shows that, the proportion of custard apple pulp was increased with increase the acidity of finish product.

The above results were supported by the results of Sharma and Gupta (1978), kadav (2001), kashid (2005) and Poul *et al.*, (2009).

It is concluded on the basis of the above result soya milk can very well be alternative of cow or buffalo milk for preparation of custard apple soya milk shake. Treatment T_2 (90:10) was more acceptable than other treatments. The chemical analysis of custard apple soya milk shake that the presence of little amount of fat (1.2), protein (3.50), carbohydrate (16.92%), ash (0.75%), acidity (0.16%) and gives higher nutritional value.

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