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FORMULATION, STANDARDIZATION AND NUTRITIONAL ANALYSIS OF SOYMILK BASED DESSERT

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Soy milk, which is attaining the popularity as an alternative to cow's milk, is not dairy milk product. Soy milk can be used as a beverage, in desserts/pudding, is ideal for cooking or baking and can also be used in tea or coffee. It does not contain lactose and cholesterol. The present research work was conducted with the objective to study the feasibility of soymilk and standardized milk (standardization at 4.5% fat and 8.5% SNF) in various proportions and also for studying its nutritional properties. The experiments were replicated three times and the data obtained during the investigation was statistically analysed by using analysis of variance (ANOVA), standard deviation and critical difference (CD) techniques. Soymilk based dessert prepared from a blend of soymilk and standardized milk having different ratio of 1:1, 1:2 and 1:3 indicate as TS₁, TS₂ and TS₃, respectively and three different level of Paneer, i.e., 5%, 10% and 15% indicated as P₁, P₂ and P₃ respectively were compared to each other. The dessert prepared from standardized milk with 10% paneer served as control (T₀P₂) for the study. Soymilk based dessert observed on the basis of nutritional analysis in regard to the carbohydrate, fat, moisture and ash; treatment TS₃P₃ was found acceptable as that of control. Also, the protein and energy content of this combination was comparable to the control. The new formed nutritious dessert is very useful for all vulnerable group, sport persons and preventive protein energy deficiency diseases.

Keywords: Soymilk, Soymilk based dessert, Standardized milk, Nutritional analysis, Critical difference

INTRODUCTION

Malnutrition is a world-wide problem and in India, it is much more severe due to low per capita income and low food budget especially in rural area. Moreover, the situation becomes much more complicated with protein malnutrition due to pure cereal based dietary pattern. It is therefore of paramount essence to explore various preparations based on cereal-pulse combination to improve the protein quality in Indian diet. Food and Agricultural Organization is also concerned about providing the recommended dietary

allowances to infants, preschool children, adolescent girls, pregnant and lactating women. It could be possible to provide low cost supplementary foods, if they are processed domestically by simple and inexpensive processing technology (Paul *et al.*, 2011).

Soymilk is not only considered as a cost effective source of energy and protein, but it has also a great potential to resolve the issue of protein energy malnutrition in India and other developing countries (Bisla *et al.*, 2012). Soymilk is cholesterol free and has been successfully utilized for the

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preparation of indigenous sweets. Soymilk can be effectively used for supplementing cereal based products because of its amino acid pattern and it is a good source of vitamin and minerals (Sharma, 2004). In addition, it has also been recommended as a supplement to bovine milk by World Health Organisation (WHO, 1996).

Soy based diets are becoming progressively popular due to nutraceutical benefits especially in the context of lactose intolerant, hyper cholesterolic diabetic, anemic people, lactating mothers and post-menopausal women. In addition, it could be adopted as a substitute for milk in the parts of the world where milk production is low and dairy products prices are inflated. In India, per capita availability of milk is only 290 gm/day in 2011-2012 (GoI, 2004) and it is decreasing due to exponential population expansion. Therefore, soymilk can be used worldwide as potential cholesterol and lactose free alternative to cow's milk at lower cost.

Milk can be modified by several processes to yield a variety of food products having specific functional properties besides increasing the food value. Processed convenient foods become an indispensable part of urbanized diets due to liberated life styles. Keeping all these facts in mind, the present study was undertaken to develop a suitable technology for the preparation of soymilk based dessert blending with standardized milk with addition of paneer. The study was designed with major objective to develop such products with high nutritional value and taste.

MATERIALS AND METHODOLOGY

The experiment was carried out in the Research Laboratory of Warner School of Food and Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology and Sciences (SHIATS), (Deemed to-be University) Allahabad. All the materials required for the study were collected from the local market of Allahabad.

Preparation of Soymilk

Experimental soymilk based dessert was prepared from a blend of standardized milk with 4.5% fat and 8.5% SNF (Solid Not Fat) and soymilk. Soymilk was prepared by the method suggested by Kapoor *et al.* (1977) and subsequently modified by Grover *et al.* (1983). In each experiment, 500 g of soybean seeds (*Glycine max*) were soaked overnight (8-10 hrs) in one percent sodium bicarbonate solution. Soybean seeds were washed with tap water and drained for 10 minutes. Seeds were the cooked at 115 °C under pressure of 0.8/cm²

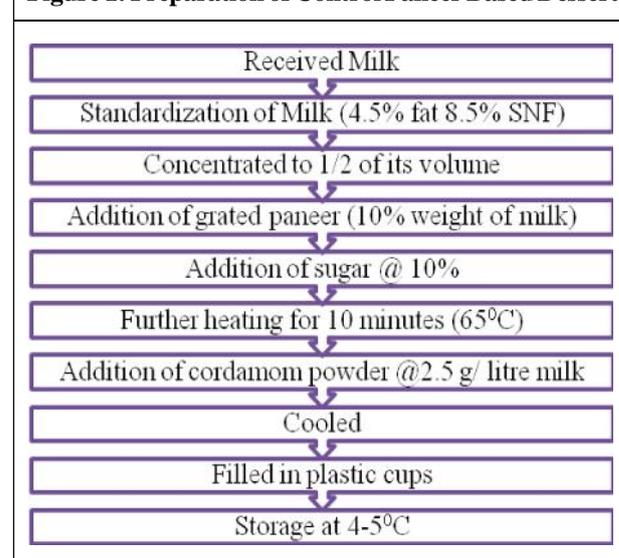
for 10-15 minutes. The soybean seeds were grounded with water (ratio 1:6) to make slurry. Slurry was boiled for two minutes and filtered through double layered cheese cloth. The filtrate came in the form of soymilk.

Preparation of Soymilk Based Dessert

Following procedure was used for the preparation of paneer based dessert (control sample) and experimental dessert (with modifications in contents).

For the experimental soymilk based dessert; soymilk was blended with standardized milk having 4.5% fat and 8.5% SNF in the ratio of 1:1, 1:2 and 1:3 indicate as TS₁, TS₂ and TS₃, respectively and three different level of Paneer, i.e., 5%, 10% and 15% indicated as P₁, P₂ and P₃ respectively. Each blend of standardized milk and soymilk was used for the preparation of experimental soymilk based dessert with standardized procedure as used in control (Figure 1).

Figure 1: Preparation of Control Paneer Based Dessert



Nutritional Analysis of Soymilk Based Dessert

The nutrient content (protein, carbohydrate), energy, moisture content, fat and ash content determination defines the nutritional value of any product. To analyze these in product, following methods were used:

- The percentage moisture content of soymilk based dessert was determined as per the procedure of ICAR (1972).
- The fat percentage was determined as per the procedure given in I.S. handbook of food analysis (1973).

- The total protein, ash and total carbohydrate were determined according to the methods of AOAC (2003).
- Energy value of the product was calculated by multiplying the figure for percentage of protein, fat and carbohydrate.

$$\text{Energy value (Kcal/100 g)} = (4 \times \text{Protein \%}) + (9 \times \text{Fat \%}) + (4 \times \text{Carbohydrate \%})$$

Statistical Analysis

The data obtained for various parameters were analyzed statistically using standard deviation, analysis of variance and critical difference techniques.

RESULTS AND DISCUSSION

Effect on Nutritional Analyses of Soymilk Based Dessert

The Nutritional analyses of the soymilk based dessert are summarized in Table 1. A highly significant difference

between the proximate compositions of control and experimental soymilk based dessert was observed in regards to the moisture, protein, fat, carbohydrates and total solids content as calculated value of F (10530.52, 630.21, 238 3.06, 167.55 and 4340.62 respectively) was greater than the tabulated value at 5% (2.46) and 1% (3.60) probability level while non-significant effect was observed in regard of ash content as F calculated (2.17) was lesser than the tabulated value at 5% (2.46) and 1% (3.60) probability level. Therefore, it can be concluded that there is a difference between various treatments of soymilk based dessert.

In context to the protein value, the TS₃P₃ (11.6) was having the protein nutrient value higher than that of the standardized control (10.27). Therefore, it may be concluded that this preparation is higher in nutrient content for protein energy malnourishment. Similar findings were reported by Biswas and Chaudhuri (2002) who examined the possibility of blending cow milk with soymilk for getting good quality chhana analogues. The chhana analogues prepared from

Table 1: Nutritional Analyses of Control and Experimental Soymilk Based Dessert

	T ₀ P ₂ (Control)	TS ₁ (1:1)			TS ₂ (1:2)			TS ₃ (1:3)			CD at 5%
		TS ₁ P ₁	TS ₁ P ₂	TS ₁ P ₃	TS ₂ P ₁	TS ₂ P ₂	TS ₂ P ₃	TS ₃ P ₁	TS ₃ P ₂	TS ₃ P ₃	
Moisture (%)	50.22±0.01	60.38±0.11	57.03±0.02	53.78±0.04	57.91±0.07	53.82±0.16	51.53±0.20	55.67±0.19	52.01±0.01	48.17±0.05	0.107* F _{cal} =10530.52
Total solids (%)	49.78±0.06	39.62±0.02	42.97±0.01	46.22±0.13	42.09±0.05	46.18±0.18	48.47±0.11	44.33±0.27	47.99±0.01	51.83±0.15	0.168* F _{cal} =4340.61
Fat (%)	13.43±0.18	7.72±0.23	9.48±0.15	11.14±0.04	8.77±0.21	10.60±0.09	12.10±0.07	9.77±0.03	11.65±0.32	13.82±0.14	0.119* F _{cal} =2383.06
Total carbohydrate (%)	24.30±0.26	22.38±0.14	22.54±0.18	22.82±0.07	23.27±0.16	23.64±0.34	23.85±0.05	24.12±0.11	24.46±0.4	24.64±0.19	0.186* F _{cal} =167.55
Protein (%)	10.27±0.13	8.15±0.09	9.46±0.26	10.64±0.31	8.58±0.18	10.3±0.1	10.84±0.05	8.92±0.06	10.16±0.15	11.6±0.25	0.119* F _{cal} =630.21
Ash (%)	1.78±0.01	1.37±0.12	1.49±0.17	1.62±0.32	1.47±0.08	1.64±0.05	1.68±0.19	1.52±0.14	1.72±0.10	1.77±0.04	NS F _{cal} =2.1789

Figure 2: Nutrient Value of the Control and Soymilk Based Dessert Samples

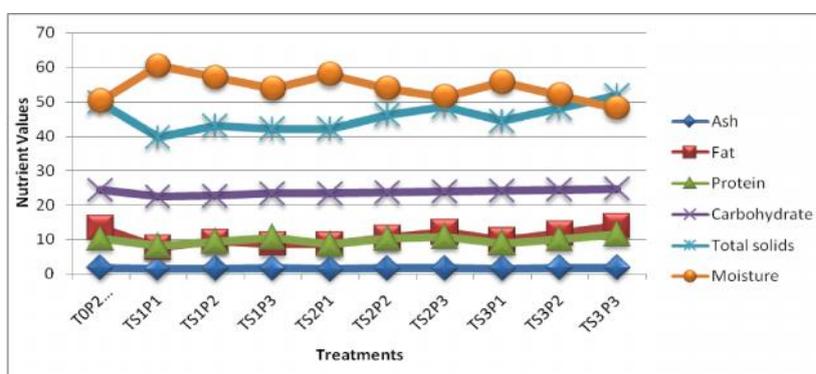
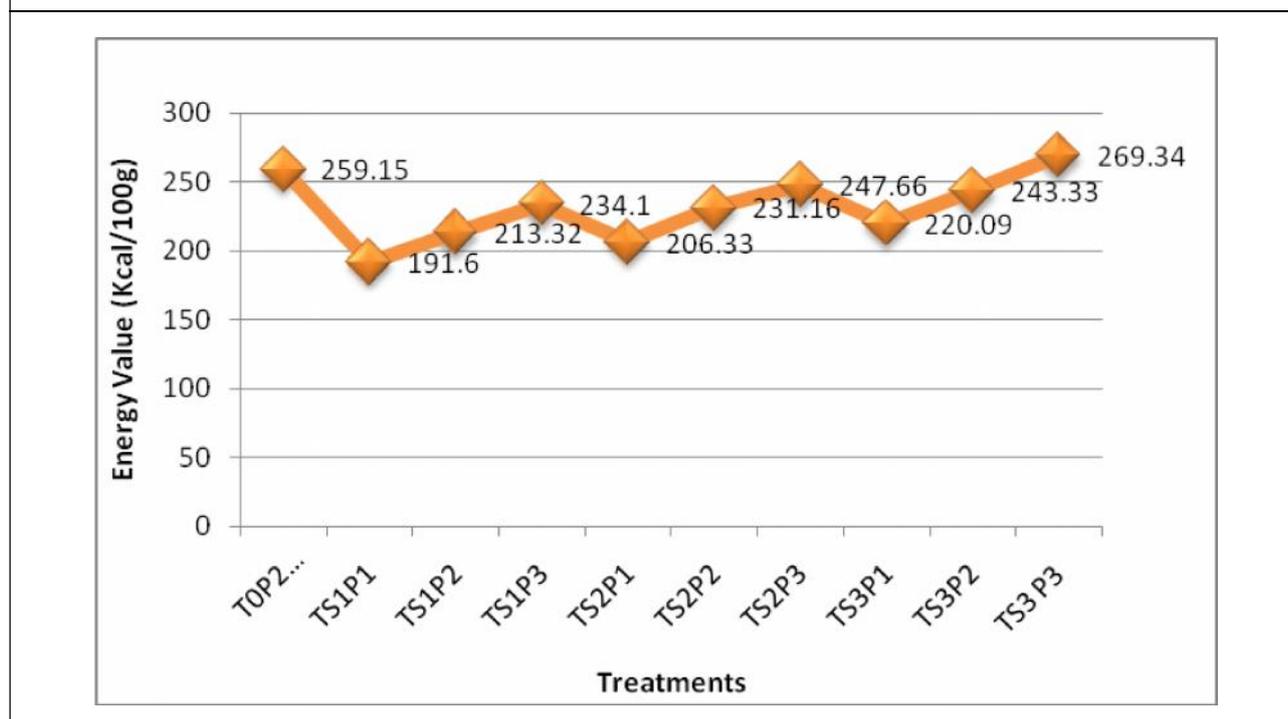


Figure 3: Energy Content of Control and Soymilk Based Dessert Samples



the blend were found to have higher protein content than the cow milk chhana.

When the comparative analysis was done for carbohydrate content, the variation was non-significant, with that of control and therefore it may be stated that the soymilk based dessert is equally acceptable as control. Non-significant variation was observed in respect of ash content between the control and soymilk based dessert. The ash content was observed (1.7) in both cases. Previous study also reported that the paneer prepared from cow milk had significantly ($P < 0.05$) higher yield, total solids, fat and ash (14.15, 44.34, 24.23 and 2.03% respectively) than those prepared from cow milk and soymilk blend and sole soymilk. The protein content increased in case of blended milk paneer as compared to cow milk paneer (Jadhavar *et al.*, 2009).

As the level of ingredients like standardized milk, paneer, soymilk increases in the dessert, the total solid content of the soymilk based dessert increases, resulting in the high nutrient value of the dessert. The same was observed in this case (Figure 2). With increase the total solid content, TS_3P_3 was observed with highest nutrient values with the total count of protein, carbohydrate and fat. It is necessary to mention here that the fat content of this dessert was

equivalent to the control, moreover the fat was drawn from the soymilk, therefore, low fat, cholesterol free and much more nourishing than the whole milk fat. The total fat content was found less in the soybean based kheer, indicating the appropriate for CVD patients (Pariskar *et al.*, 2015). The soymilk with Guar gum has been used for the non-conventional ice-cream preparation (Ahsan *et al.*, 2015).

Energy Content of Control and Soymilk Based Dessert

It can be observed from Figure 3 that the maximum energy content of 269.34 Kcal/100 g was recorded in TS_3P_3 followed by T_0P_2 (259.15), TS_2P_3 (247.66), TS_3P_2 (243.33), TS_1P_3 (234.1), TS_2P_2 (231.16), TS_3P_1 (220.09), TS_1P_2 (213.32), TS_2P_1 (206.33) and TS_1P_1 (191.6). The difference found in the energy content of (TS_3P_3) treatment combination was due to variations in blended milk (standardized milk and soymilk) and paneer percentages as the level of standardized milk along with percentage of paneer increases in the soymilk based dessert it enhances the energy content of the product. The feasibility and sensory evaluation of this product signified its acceptable quality (Yadav, 2016).

In the light of the above experiments and finding, the use of Soymilk in the milk based dessert is highly recommended for the protein malnourished people with

variable proportion of the paneer. Though, the soymilk has been also recommended as substitute for dairy milk in muffins and popovers (Swanson *et al.*, 2012); nutritionally, use of light soy milk is recommended. It can be recommended for all the vulnerable group, CVD patient and protein energy deficiency diseases.

CONCLUSION

From the findings of this study, it was concluded that the acceptable quality of soymilk based dessert from the blend of soy milk with standardized milk can be prepared. On the basis of nutritional analysis (treatment TS₃P₃) standardized milk and soymilk in a ratio of 1:3 with 15% paneer has comparable fat, protein, carbohydrate, total solids moisture, ash content and energy value as that of the control(T₀P₂). It can be used for dessert in acceptable limit which have significantly higher protein content and energy value and may be recommended for inclusion in diets to benefit children and adults as well as CVD patients. This newly formed value added product is very useful for all vulnerable groups and also helps in preventing protein energy malnutrition in children as also in sports person.

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