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Utilization of tender coconut (*Cocos nucifera* L.) milk in the preparation of pudding

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ABSTRACT

The objective of the present study was to standardize pudding recipe and optimize the proportion of coconut milk in the pudding. Good quality matured nuts were selected for extraction of coconut milk. Buffalo milk was concentrated in the ratio of 2.5 : 1 and sugar (16%) was added. The milk along with 2% gelatin was used as recipe with different proportions of coconut milk of 5%, 10% and 15%. The chemical analysis showed that coconut milk is a rich source of fat than buffalo milk. The fat content, carbohydrate and protein contents of coconut milk pudding increased as the level of coconut milk increased. There was no significant change in titratable acidity as the level of coconut milk increased. Organoleptic evaluation showed that pudding containing 10% coconut milk gave best sensory score among all the combinations tried.

Key words : Pudding, Milk, Coconut milk, Condensed milk, Organoleptic evaluation

INTRODUCTION

Milk being rich in nutritive value, has been an important source of food to human since the dawn of cultivation. Milk is called complete food, since it supplies body building proteins, health giving vitamins, bone forming minerals and energy giving lactose and milk fat. India is world's largest producer of milk. In 2006-2007 milk production almost goes up to 100 MT (Rao, 2008). Milk is most precious liquid food in nature. Man has evolved in close contact in nature and the first food nature provided for man was milk, which is called "Dugdha" and "Kshira" in Sanskrit. Milk is an important part of Indian diet. The role of milk in health as the most wholesome single food available in nature for health and a medicine has never been debated. Ancient Vedic literature is full of evidences of the beneficial therapeutic properties of milk and milk products.

Dairy today occupies the second position in term of output take in all agricultural activity. The cost of dairy products has risen considerably over the years, which has given the impetus to development of wide range substitutes with cost effectiveness, nutritional and functional properties

(Chandra and Alam, 2007). We have successfully won the battle against milk scarcity and now a days instead of milk by use of different ingredients adding to its appeal fruits like jackfruit, cherry, pineapple, fig, dates, clove, orange, mango, walnuts, etc can be used alones or in a combination and accordingly are named as jackfruit pudding, cherry pudding etc. There is great variation in pudding recipe from place to place and it may even change with a slight change in constituent's content. Thus, there is considerable scope for standardization of pudding technology.

Coconut milk is the milky white liquid squeezed out from grated coconut meal (Hagenmaier, 1988). Coconut milk is an emulsion of coconut oil in water in to which some of soluble components of the milk have already been passed. Coconut milk is a good source of vegetable casein (Pulari and Wadhwa, 2002). Apart from the household culinary uses, coconut milk is also utilized as a substitute for dairy cream as evaporated and condensed milk in the preparation of white soft cheese and similar food recipes. As compared to cow's milk, coconut milk is richer in fat but poor in protein and sugar. Functionally coconut milk is

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an oil based flavoring agent. Coconut milk is usually extracted from freshly grated coconuts or desiccated coconuts and refrigerated in the same way as dairy milk. The health benefits of coconut have been recognized for 400 year in India, as mentioned in Ayurveda (Kabara, 2003). Coconut fat helps to maintain a healthy ratio of W_6 to W_3 fatty acids, which can be consumed as a part of diet. It reduces fat accumulation in the body. It is rich in lauric acid, a source of disease fighting fatty acid derivative monolaurin, increases, HDL cholesterol and doesn't elevate LD cholesterol triglyceride (Coconut Development Board, 2002 and Manglika *et al.*, 2005).

Pudding most often refers to a dessert but can also be a savory dish. The word pudding probably comes from the French *boudin*, the originally from the Latin *botellus*, meaning is "small sausages". In the 'United Kingdom' and some 'Commonwealth' countries, pudding is a common term for any dessert.

In the present investigation attempts have been made for optimization of the coconut milk in the pudding and to improve the acceptability by addition of coconut milk.

MATERIALS AND METHODS

The coconut milk was extracted as per the procedure suggested by Aramughan *et al.* (1984). The good quality kernel and matured nuts were selected for the extraction of coconut milk. These kernels were split manually under hygienic condition without pairing. The kernel in the shell was subjected to milling by applying it over a specially revolving a spiky ball. This process was given white grated kernel. Then this ground wet kernel was squeezed through muslin cloth to get milky white extract, which is known as coconut milk.

The fresh buffalo milk was procured from local supplier. This milk was concentrated in the ratio of 2.5: 1 (De, 1999). The coconut milk pudding was prepared as procedure given by Holmukhe, 2004. The coconut milk was used in the different proportions along with the 2% gelatin (Fujii, 1994). The formulation for the coconut milk pudding is given Table 1. The detail flow diagram for coconut milk pudding is given in Fig. 1.

Table 1 : Formulation for coconut milk pudding

Sample	Coconut milk (%)	Buffalo milk (%)	Sugar (%)	Gelatin (%)
T ₀ (Control)	0	100	16	2
T ₁	5	95	16	2
T ₂	10	90	16	2
T ₃	15	85	16	2

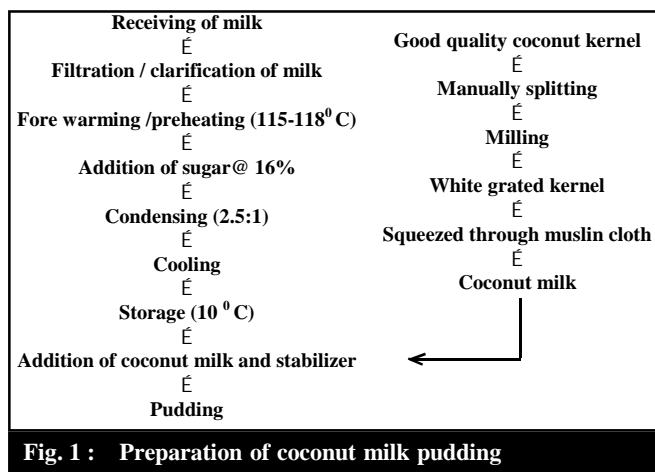


Fig. 1 : Preparation of coconut milk pudding

The coconut milk, buffalo milk and coconut milk pudding were analyzed for the fat, total solids titratable acidity, carbohydrate and protein. Fat content was determined by Gerber method as described in IS: 1224 (Part I), 1977. The total solid content was estimated by gravimetric method as per IS: 1479 (Part II), 1961. Titratable acidity of buffalo milk was determined by the method described in IS: 1479 (Part I) 1960 and titratable acidity of the coconut milk was determined as per the method given by Ranganna (2000). Where as the carbohydrate and protein were estimated by the procedure give by Ranganna (2000).

The coconut milk pudding samples were subjected for the sensorial analysis to check the acceptability of the pudding. The sensory characteristics such as appearance, body texture, colour, flavour and over acceptability were evaluated by semi trained panel of judges using 9 point hedonic scale (Ingle *et al.*, 2009).

The analytical data obtained for coconut milk pudding were subjected to analysis of variance (ANOVA) using complete randomized design according to Panse and Sukhatme (1989). The critical difference at $P < 0.05$ was estimated and used to find significant difference, if any.

RESULTS AND DISCUSSION

The results obtained from the present investigation have been discussed in the following sub heads :

Physico-chemical analysis of buffalo and coconut milk:

The buffalo milk and coconut milk was analyzed for the different physic-chemical parameters and results obtained are tabulated in Table 2. The data show that the fat content of coconut milk was higher than buffalo milk. The coconut kernet contained more fat, which was

Table 2 : Chemical composition of buffalo milk and coconut milk*

Parameters	Buffalo milk (%)	Coconut milk (%)
Total solid	17.2 ± 0.25	57.2 ± 0.31
Fat	6.1 ± 0.15	41.0 ± 1.00
Protein	3.8 ± 0.30	3.4 ± 0.15
Carbohydrate	5.1 ± 0.25	11.9 ± 0.17
Ash	0.8 ± 0.21	0.7 ± 0.15
Titrate acidity	0.15 ± 0.02	0.45 ± 0.03

*Results are mean ±SD of three determinations

extracted in the milk during processing. The coconut milk contained higher amount of the carbohydrate (11.9%) than the buffalo milk (5.1%). Even though the coconut milk contained higher amount of carbohydrate but it was lacking in lactose content (Salunkhe and Kadam, 2005). Though the protein content of the coconut milk was lower than the buffalo milk, but good amount of all essential amino acids were present (Flavier *et al.*, 1990 and Guntileke and Laurentius, 1974). The results obtained were well comparable to that reported by Rajyadax *et al.* (2000), Gopalan *et al.* (2004) and Aramughan *et al.* (1984).

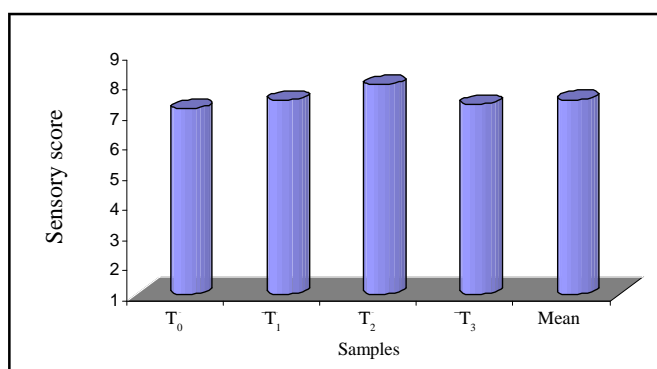
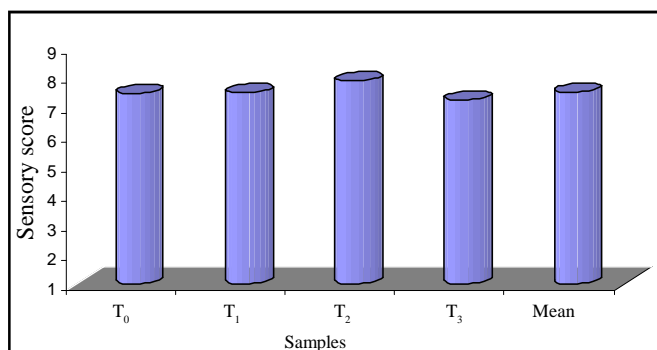
Effect of incorporation of coconut milk on physico-chemical parameters of pudding:

The results of chemical analysis of coconut milk pudding prepared by using different levels of coconut milk have been furnished in Table 3. The fat, total solids, protein and carbohydrate content increased with increase in the level of the coconut milk. This may be due to the composition of coconut milk which was added during the manufacturing of pudding. There was no significant effect on the titratable acidity as the level of the coconut milk was increased. This indicated that there was increase in nutritional quality of pudding when coconut milk was incorporated, which will be benefited to the people suffering from the mal nutrition. The results are in good agreement with earlier results reported by Rajaydhax *et al.* (2000).

Organoleptic evaluation of milk pudding:

Organoleptic evaluation of any consumable product

is the best method of judging the acceptability of the product in the consumers. The assessment was done by studying the characters like colour, taste, flavour, appearance and overall acceptability of the product by using panel of 10 semi-trained judges. The graphical representations of results of sensory evaluation are presented in Fig. 2 to 5. Fig. 2 shows that even though all samples scored good scores for appearance, the sample T₂ was highest among them. The sensory scores for texture of pudding were improved as increase in the level of coconut milked upto 6%, but afterwards it decreased (Fig. 3). The flavour score was improved by addition of the coconut milk upto 6% level. Above 6% level coconut milk masked the flavour of the milk, which reduced the


Fig. 2 : Sensory score for appearance of coconut milk pudding

Fig. 3 : Sensory score for body and texture of coconut milk pudding
Table 3 : Effect of incorporation of coconut milk on physico – chemical properties of pudding

Sample	Fat (%)	Total solids (%)	Titrate acidity (%)	Carbohydrate (%)	Protein (%)
T ₀	8.50	72.98	0.39	40.75	9.50
T ₁	10.13	81.46	0.40	41.34	9.67
T ₂	12.75	89.70	0.41	41.94	9.84
T ₃	13.37	92.43	0.42	42.53	10.00
SE	0.860	4.391	0.006	0.383	0.108
C.D. (P=0.05)	2.734	13.963	0.021	1.219	0.343

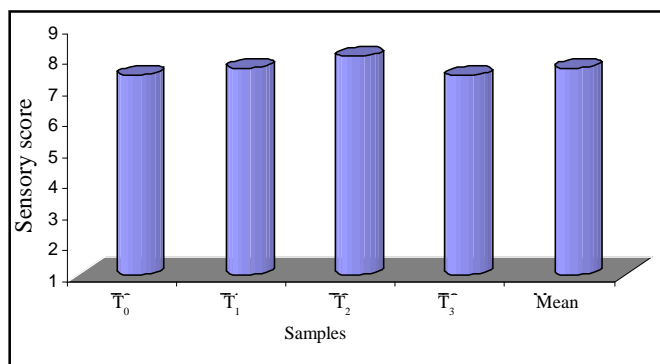


Fig. 4 : Sensory score for flavour to coconut milk pudding

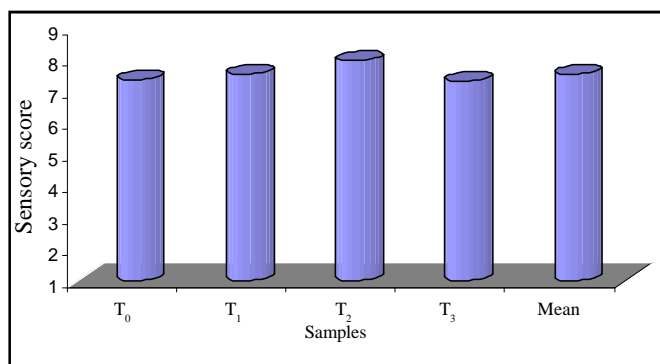


Fig. 5 : Sensory score for overall acceptability of coconut milk pudding

scores for flavour (Fig. 4). The sensory score for overall acceptability of the sample T₂ was higher than other samples (Fig. 5). On the basis of the sensory score it was concluded that the pudding sample T₂ incorporated with 6% coconut milk was best among all samples.

Conclusion:

The chemical analysis and sensory analysis revealed that sample T₂ (10 % coconut milk) coconut milk pudding had higher sensory score and it provided higher fat, protein and carbohydrates as compared to the control sample. From the result of present investigation it may be concluded that, the quality of milk pudding is influenced by different levels of coconut milk. Coconut milk is having various medicinal values, so can be utilized as a functional food to control many physiological disorders.

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