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Research Article

UTILISATION OF COCONUT EXTRACT IN THE PREPARATION OF FLAVOURED MILK

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A B S T R A C T

The project was aims to utilize coconut extract into the flavoured milk as well as to develop the method of manufacture and to determining the changes in the physicochemical and sensory characters of the coconut flavoured milk during storage. Coconut extract from mature coconut was made by three ways: i) pressing the coconut kernel ii) extraction of kernel with potable water and iii) extraction of kernel with skim milk. Since these extracts contained high fat levels, these were added to skim milk in such proportions as to get different fat levels in the milk (1.5, 3.0, and 4.0%). Among these samples milk containing 4 % fat levels were selected.Different sugar levels were use during the preliminary trails and among them 8 % sugar level was optimised. The preparation method includes extraction of coconut kernel with skim milk, mixing of the extract with plain skim milk in 1:0.7 ratio, heating to about 60°C, homogenisation, heating at 82°C for one minute and cooling. The final product composition was 4.0% Fat, 8.0% sugar, 3.4% protein, 0.7% ash and total solid 22.0%. The coconut flavoured milk was rich in lauric and meristic fatty acids which was determined by the GC analysis. The TBC counts ranged from: 15 x 10^3- 25 x 10^3 per ml; YMC from 0-10 ×10^1per ml; coli forms were absent per ml in the optimised product. The shelf life of the flavoured milk was 8 days at 4°C. Shelf life was estimated by the sensory parameter, acidity and free fatty acid changes during storage.

INTRODUCTION

With the current upward trend in national and international health awareness among the consumers, the demand for functional food has increased. Coconut extract has higher calories and fat than whole dairy milk, the plant-based saturated fat in coconut milk may give health benefits not found in the animal-based saturated fat in dairy milk.Some recent studies have been shown that coconut milk has helpful in the health of the gastrointestinal tract due to its antibacterial activity, hyperlipidemic equilibrating qualities and useful for topical applications (Paniappan 2002). Coconut milk is a considerable source of lauric acid. It is a medium chain saturated fatty acid which enhances the quantity of high density lipoprotein cholesterol in blood. It has been scientifically proven that the coconut oil is much better by comparing with saturated fats due to the health risks inflicted by the latter (Amarasiri and Dissanayake 2006; Tarrago-Trani *et al*. 2006). The major factor responsible for the hypolipidemic effect of coconut protein is the high content of L-arginine (Mini 2004).

Coconut flavoured milk is a plant milk manufactured from extract of mature coconut with a creamy texture and nutty taste. The new products developed from coconut could potentially be of desirable nutritional composition especially in relation to cholesterol inducing fat levels, being as it is that the saturated fat content in coconut milk has been shown to be a good saturated fat, easily metabolized to give the body quick energy (Timmen and Patton 1989).

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MATERIALS AND METHODS

Materials

Fresh and mature coconuts (10–12months old), sugar were procured from the local market of Bengaluru

Methods

Pure extraction of coconut

Selected matured coconuts were broken in to pieces of suitable size. Then cut part was subjected to scrubbing, where the white coconut meat scrubbed by using metallic scrubber to produce coconut shreds. These shreds having slightly large size so, again it grind into the fine size by using mixer. These fine particles were passed to muslin cloth and applied force over it to expel the milky extract. The obtained extract looks like a milk cream, it contain fat in the range 37- 44%.

Aqueous extraction of coconut

Selected matured coconuts were broken in to pieces of suitable size. Then cut part was subjected to scrubbing, where the white coconut meat scrubbed by using metallic scrubber to produce coconut shreds. These obtained shreds 200gm

were mixed with 350 ml of water. Mixture was heated to 60°C for 5 minutes. Then filter by the muslin cloth. The retaintate obtain during filtration were made into fines and subjected to the force to extract the fluid. The obtained fluid contains around 22% fat.

Skim milk extract of coconut

Selected matured coconuts were broken in to pieces of suitable size. Then cut part was subjected to scrubbing, where the white coconut meat scrubbed by using metallic scrubber to produce coconut shreds. These obtained shreds (100gm) were mixed with the 300 ml skim milk. Mixture was cooked to 60°C for 5 minutes. Then filter by the muslin cloth. The retaintate obtain during filtration were made into fines and subjected to the force to extract the fluid. The obtained extract contains 6 - 7% coconut fat.

Method of preparation of coconut flavoured milk

Freshly obtained skim milk coconut extract having 6.0% fat was standardised by addition of skim milk, to maintain 4.0% fat in final product. Then it was preheated up to 60°C for 5 minute. 0.02% CMC (carboxyl methyl cellulose) was mixed with sugar before addition to the milk to avoid the clump formation. Quantity of sugar used for the preparation of flavoured milk was 8.0% on the basis of milk. Then it was subjected to the pasteurization at 85°C for 1 minute then cooled to 5°C.The process for manufacturing of coconut flavoured milk is given figure-1.

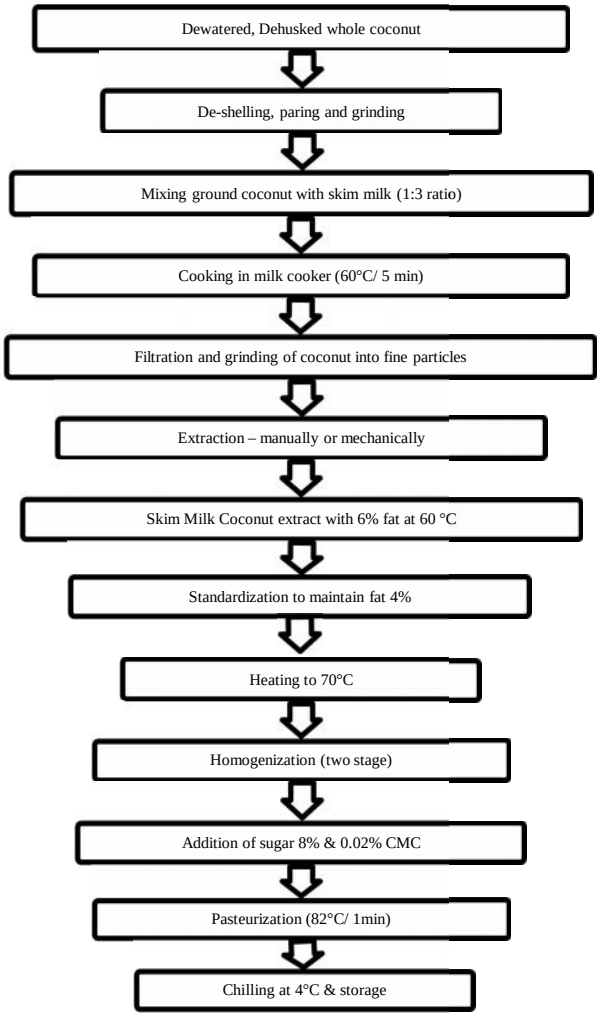

Fig 1 process flow chart for optimised product

Chemical analysis

Total solids, fat, total nitrogen and ash contents of samples were determined according to AOAC (2012).Titrable acidity in terms of % LA Measure 10 ml of sample into the suitable dish and dilute with twice its volume CO2 free water add 2.0 ml phenolphthalein and titrate with 0.1 N NaOH to first persist pink. If measured volume was used, determine its weight from specific gravity of test sample report acidity as % lactic acid by weight. The fat content of the extract and the optimised product was analysed by using gravimetric method.The ash content of milk was estimated by the gravimetric method. Protein content of the optimised product as well as extract was measured by the kjeldahl method. Lactose was measured by the Lane Eynon method. Chroma values were measured by using adobe Photoshop reader.

Sensory Evaluation

Samples of milk were organoleptically scored by the staff and student of the Dairy Technology Department, Southern Regional Station of National Dairy Research Institute Bangalore. The score points were given to the samples were as per the 9-point hedonic scale.

Microbial Analysis

Preparation of saline solution

The saline solution was used for preparing serial dilutions of the sample for microbiological analysis. Sodium chloride (8.5g) was dissolved in 100 ml distilled water and pH was adjusted to 7 ± 0.1 and filled in the test tubes at the rate of 9 ml in each test tube plugged with cotton plugs and autoclaved at 121°C for 15 minute. Alcohol was applied on one of the corner of the product bottle. The bottle was then opened in laminar flow conditions and 1 ml of coconut flavoured milk was transferred aseptically to 9 ml of sterile saline blank and mixed well. Again 1 ml from 1:10 dilution transferred to 9 ml saline blank to get progressive 1:100 dilutions.

Detection of Yeast and Mold Count

Yeast and mold count in coconut flavoured milk was enumerated by the pour plate method by plating 1 ml of 0, 1^{st}, and 2^{nd} dilution of the product employing Potato Dextrose Agar. Duplicate plates were incubated at 30°C for 42-72 hrs. Colonies with visual growth were counted and expressed as CFU/ ml of the product.

Detection of Coliform count

Coliform count in coconut flavoured milk was enumerated by the pour plate method by plating 1 ml of 0, 1st, and 2nd dilution of the product employing Maconkeys Agar. Duplicate plates were incubated at 37°C for 24 hrs. Colonies with visual growth were counted and expressed as CFU/ ml of the product.

Detection of Total Bacterial Count

Total Bacterial count in coconut flavoured milk was enumerated by the pour plate method by plating 1 ml of 0, 1^{st}, and 2^{nd} dilution of the product employing milk Agar. Duplicate plates were incubated at 37°C for 24-48 hrs. Colonies with visual growth were counted and expressed as CFU/ ml of the product.

Statistical Analysis

Data were expressed as mean values with standard errors. In experiments, one way analysis of variance (ANOVA) with subsequent least significant difference (LSD) test was applied for multiple sample comparison to test any significant difference ($P<0.05$) between the mean values of all groups as described by (Snedecor and Cochran 1994).

RESULT AND DISCUSSION

Three type of coconut extract was prepared for the standardization of extract i.e. pure coconut extract, aqueous coconut extract and skim milk coconut extract from the matured coconut. These types of extract were differs in there composition and are shown in Table-1.

Table 1 composition of different type of extract

parameters	Pure coconut extract	Aqueous coconut extract	Skim milk coconut extract
Total solids	53 ± 4	28 ± 2	15 ± 1
pH	6.3 ± 0.1	6.8 ± 0.1	6.6 ± 0.1
Acidity	0.23 ± 0.02	0.17 ± 0.01	0.20 ± 0.01
Fat	39 ± 4	23 ± 1	6.0 ± 1
Protein	2.5 ± 0.2	1.8 ± 0.2	3.1 ± 1
L* value	99.573	99.969	99.749
a* valve	-0.696	0.3671	-0.744
b* value	4.3671	0.5459	3.8682
Whiteness index	95.557	99.341	96.063
Yellowness index	6.2655	0.780	5.540
Browning index	3.8199	0.793	3.2769

Type of coconut extract

The results obtained from the study shows that, the TS content of the extracts were 53, 28 and 15% in pure coconut extract (PCE), aqueous coconut extract (ACE) and skim milk coconut extract (SCE), respectively. There was significant increase in the acceptance of skim milk coconut extract at ($P < 0.05$). The a* and b* values indicate reddishness and yellowishness values respectively which were negligible because the values were very low. As such yellowness and browning indices were also of not much significance. From whiteness index value it was observed that aqueous coconut extract was slightly reflected more light than skim milk coconut extract and pure coconut extract. This could be because of more light refraction by fat globules (Rattanathanalerk 2005; Waisundara *et al*. 2007). L* is a luminance component which ranges from 0 to 100 while a* and b* are colour co-ordinates related to red/ green and yellow/ blue respectively varying from -120 to 120. The decrease in the L* value means surface turns darker, increase in a* value means colour turns to red and increasing b* means colour is turning to yellow. Yellowness index reflects the change in colour of test sample from white to yellow (Pathare *et al*. 2013).

Effect of type of coconut extract on the sensory quality of coconut flavoured milk

All the three extracts were separately mixed with skim milk to obtain 4% fat in the final mixture, added with 8% sugar and pasteurised at 85^{o}C for 1 min. The chilled samples of the flavoured milks were subjected to sensory evaluation.It was observed that all the samples looked white, but SCE flavoured milk scored better for colour and appearance (8.03) and other sensory attributes like flavour (7.93), body and texture (7.43). ACE flavoured milk scored significantly least ($P<0.05$) in all the sensory attributes.This is because of dilution effect of water extract.

Effect of fat content on the sensory parameters of coconut flavoured milk

Four different levels of fat were studied (1.5, 3.0, 4.0 and 6.0%). Skim milk extract of coconut was added in different proportions to skim milk to obtain these fat levels in the final product and preceded with flavoured milk preparation. The chilled flavoured milk was subjected to sensory analysis and the results are shown in Table-2. The product of 6.0% fat level was very unstable for heat treatment that is coconut fat and particles stuck to the sides of container possibly because of separation from the serum phase.So, the 6.0 % fat level was not considered. The colour and appearance (CA) scores of the flavoured milks were 7.02, 7.56 and 8.03 respectively for 1.5, 3.0 and 4.0 fat levels.It is clear that fat played a role in appearance of the final product. Fat is present in globular state and contributes to consistency of product (Simuang 2004). Hence, the higher the fat content, more consistent the product is. Judges preferred a product with optimum consistency because it is symbolic of coconut extract. The flavour also increased with increased coconut extract addition and thereby coconut fat. Coconut fat and some volatile Phenolic acid (Syringic acid Hydroxybenzoic acid, Gallic acid, Cinnamic acid) compound formed during processing gives a pleasing flavour attributed to its fat content (Appaiah *et al*. 2014 and Tinchan *et al*. 2015). The flavour scores were 6.7, 7.4 and 7.91 respectively for 1.5, 3.0 and 4.0% fat levels. Similarly, increase in body and texture scores was obtained with increase in coconut extract and thereby fat content. Among the three fat levels (1.5, 3.0 and 4.0%), 4.0% fat level was found more acceptable as per the sensory scores. As the fat level increased, the flavour of the product also increased due to the more concentration of coconut extract; up to the 4.0% fat level it improved the body and textural parameter also. The total solids content of the milk increased with the increase in the extract level i.e. 19.26, 20.68 and 22.55% for the fat content 1.5, 3.0 and 4.0%, respectively. Similarly, the viscosity also increased from 1.8, 2.0 and 2.4 cP at 27°C, respectively. This indicates fat content had profound relation with viscosity.

Table 2 sensory analysis for different fat and sugar level

Sensory parameter	% Fat			% sugar		
	1.5	3.0	4.0	6.0	8.0	10.0
Colour and appearance	7.0182±0.351^{a}	7.5545±0.233^{a}	8.0273±0.21^{b}	7.80 ±0.20^{a}	8.0 0 ±0.0^{a}	7.93±0.11^{a}
Flavour	6.7±0.286^{a}	7.4±0.161^{b}	7.909±0.175^{c}	7.76±0.05^{a}	8.33±0.28^{b}	7.56±0.11^{a}
Body and texture	6.6±0.232^{a}	7.4545±0.201^{b}	7.9272±0.249^{b}	7.76±0.05^{a}	8.16±0.28^{a}	7.83±0.27^{a}
Sweetness	7.5181±0.199^{a}	7.859±0.208^{a}	8.0454±0.18^{a}	7.60±0.17^{ab}	8.16±0.28^{b}	7.26±0.46^{a}
Overall acceptability	6.45±0.128^{a}	7.0545±0.157^{b}	7.9272±0.161^{c}	7.63±0.15^{a}	8.20±0.24^{b}	7.40±0.17^{a}

Note: Values are mean ± SE (n = 3); Values with different superscripts (a, b) differ significantly within the rows at $p < 0.05$

Further, another reason was that the presence of large number of particles increased resistance to the flow which hence resulted in an increase in the apparent viscosity (Thitima *et al*. 2006). a* and b* values increased with increase in the fat level which may be attributed to some changes in milk because of heat treatment and fat-protein interactions (Siriwongwilaichat *et al*. 2004)

Effect of sugar level on the coconut flavoured milk

Three levels of sugar were studied, 6.0, 8.0 and 10% respectively. The optimum sugar level was standardised on the basis of sensory evaluation and colour parameters. The CA scores were 7.80, 8.00 and 7.93 for 6, 8 and 10% sugar levels respectively which however did not differ statistically (P>0.05) (Table-2). The sweetness scores were 7.60, 8.16 and 7.26. It was observed that 8% sugar gave optimum sweetness and so scored highest (P<0.05) and 10% sugar level scored the least because of excessive sweetness.The body and texture scores of the samples containing 6, 8 and 10% sugar levels were 7.76, 8.16 and 7.83 respectively which however were not statistically significant (P>0.05). Though sugar is soluble in water and enhances viscosity of any solution, in coconut flavoured milk, it did not enhance sensory acceptance level.As per the results obtained 8.0% sugar was most acceptable followed by 10 and 6.0% respectively.It was observed that as the sugar level increased the a* and b* values increased. As the sugar content increased the value of the browning index and the yellowness index also increased, and total solids also increased.The sugar solutions get darkened with increase in temperatures (Pedreschi *et al*. 2005). Little glucose present in coconut extract (Seow *et al*. 1997) also contributes to any change in colour parameters.

Effect of homogenisation on the quality coconut flavoured milk

Homogenisation was done for the uniform distribution of the fat into flavoured milk. As the coconut fat contains saturated fatty acid, it easily tends to crystallise out. Further, homogenisation prevents the creaming of the product. Homogenisation is known to enhance whiteness and consistency of milk (Simuang 2004) which could be attributed to enhanced light scattering by broken down fat globules and enhanced surface area of fat (Lee and lucey2010). Therefore, effect of homogenisation of the flavoured milk on the colour quality of the product was studied. After homogenisation the viscosity and whiteness of the product increased. Both homogenized and non-homogenized samples were heated at 85 °C for 1 min. Homogenization reduced the size of the primary emulsion droplets, but increased the degree of flocculation, presumably via a bridging mechanism. This flocculation was also responsible for increased viscosity of the homogenized samples. The viscosity of the unhomogenised product was 2.4 cP at 27°C, while the homogenised product was 2.9 cP at 27 °C. Heating increased the degree of flocculation in both non-homogenized and homogenized samples (Tangsuphoom *et al*. 2005).

Composition of the coconut flavoured milk

Proximate composition of major constituents of coconut flavoured milkis given in table–3. It was observed from the table that there was not much difference between control flavoured milk containing milk fat and that of coconut fat containing flavoured milk.

Table 3 composition of the optimised product

Parameters	Control	Optimised product
Fat %	4.0 ± 0.02	4.0 ± 0.02
Total protein %	3.6 ± 0.1	3.2 ± 0.2
Lactose %	4.6 ± 0.2	4.0 ± 0.2
Ash %	0.78 ± 0.03	0.85 ± 0.04
Sugar %	8.0	8.0
Other carbohydrates %	---	1.95 ± 0.3
Total solids%	21 ± 0.5	22 ± 0.75
Acidity (%LA)	0.155 ± 0.02	0.16 ± 0.02
pH	6.6 ± 0.15	6.6 ± 0.2

Fatty acid profile of coconut fat

Fatty acidsprofiles of coconut fat are shown in fig. 2. It was observed that coconut fat contains short chain saturated fatty acids (C4-C8), medium chain saturated fatty acids (C10- C14) and long chain fatty acids (C16- C20). It contains lauric acid (C14) in the highest quantity. As compare to cow milk fat it is rich source of lauric acid, while for the other fatty acids it does not shows much differences. Lauric acid enhances the quantity of high density lipoprotein cholesterol in blood. It has been scientifically proven that the coconut oil is much better by comparing with saturated fats due to the health risks inflicted by the latter (Amarasiri and Dissanayake 2006; Tarrago-Trani *et al*. 2006).

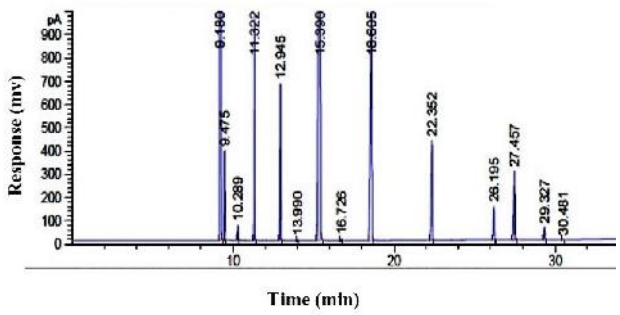

Fig 2 Fatty acid profile of coconut fat GC analysis

Shelf life study

Pasteurized flavoured milk with and without coconut extract were stored at the refrigeration temperature (6 - 8°C) to study the shelf life. Samples were drawn on 0^{th}, 2^{nd}, 4^{th}, 6^{th} and 8^{th} day and were analysed for the chemical composition and microbiological quality. Simultaneously. A detailed study was conducted on the physico-chemical, microbiological and sensory attributes of flavoured milk containing coconut extract and flavoured milk (as control).

Physico chemical changes during storage

Viscosity

Viscosity is an important property in controlling the consistency of various liquid foods and it is also useful in evaluating the thickening property of proteins. The viscosity of pasteurised flavoured milk with coconut extract packed in PET bottles and glassbottles respectively is shown in the Table-4. The initial viscosity of the flavoured milk ranged from 2.47 – 2.54 cP which is because of slight batch to batch variation. In PET bottle, the viscosity of the coconut flavoured milk increased from an initial value of 2.54 to 2.75 cP on 8th day. Similarly, the increase in the viscosity of the product packed in glass bottles was from 2.47 to 2.51 cP. It was observed that the viscosity increased with increase in the storage time (P<0.05). Packaging material did not affect the viscosity during storage.

Table 4 Effect of storage# on viscosity (cP), FFA and Acidity of coconut flavoured milk

Day	PET			Glass		
	viscosity	FFA	Acidity	viscosity	FFA	Acidity
0	2.54± 0.1^{aA}	0.4±0.0^{aA}	0.15±0.0^{aA}	2.47± 0.2^{aA}	0.43±0.06^{aA}	0.16±0.01^{aA}
2	2.65± 0.1^{aB}	0.43±0.06^{aAB}	0.17±0.01^{bB}	2.58 ± 0.1^{aB}	0.47±0.06^{aA}	0.16±0.0^{1aA}
4	2.68±0.1^{aBC}	0.43±0.06^{aAB}	0.18±0.01^{aB}	2.60± 0.1^{aB}	0.50±0.0^{aA}	0.16±0.01^{aA}
6	2.73±0.03^{cC}	0.50±0.0^{aAb}	0.19±0.0^{bC}	2.66±0.02^{bC}	0.50±0.0^{aA}	0.19±0.0^{bB}
8	2.75±0.04^{bC}	0.53±0.06^{bBC}	0.21±0.01^{cD}	2.71±0.02^{bC}	0.60±0.0^{bB}	0.19±0.01^{bB}
9	2.81±0.2^{bCD}	0.57±0.06^{bc}	0.21±0.01^{cD}	2.71±0.02^{bC}	0.60±0.0^{bB}	0.19±0.01^{bB}

Note: Viscosity was analysed at 40° C; values are mean ± SE (n = 3); values with different superscripts (a, b, c) differ significantly within the rows at P < 0.05; values with different superscripts (A, B, C) differ significantly within the columns at P< 0.05; #storage temperature: 6-8°C (viscosity in cP, FFA= % lauric acid and acidity = % lactic acid)

The statistical analysis of the data also revealed that there was significant difference (p<0.05) in viscosity values of all three samples of flavoured milk but no significant difference was observed between the packaging materials. The increase in viscosity of milk during storage was reported by a number of workers earlier (Amador *et al*. 2014) and the same was reported during storage of coconut extract also (Khuenpet *et al*. 2016). This may be attributed to casein micelle aggregation during storage and protein-protein interactions (Khuenpet *et al*. 2016)

Free fatty acid

The initial FFA content of coconut flavoured milk was 0.40 – 043 % lauric acid, which significantly increased to 0.53% (PET bottle) and 0.60% lauric acid (glass bottle) at the end of 8th day. The free fatty acid content of flavoured milk seemed to gradually increase during storage as seen from the FFA values (expressed as % lauric acid) given in Table -4, but the increase was not statistically significant (P>0.05). However, at the end of 8th day, there was slight increase in the FFA content. Packaging material also did not show any significant (P>0.05) difference in change in the free fatty acids

Titrable Acidity

The changes in the titrable acidity of flavoured milk with coconut extract stored in PET bottles, and glass bottles are shown in the Table-4. From the table it was observed that there was significant (P<0.05) difference in the change in acidity as the storage time increased. The initial acidity of coconut flavoured milk was 0.15-0.16% which increased to 0.19 (glass bottle) and 0.21% (PET bottle) at the end of 9th day of storage. The increase in acidity could be attributed to growth of microorganisms leading to acidity development. It may be said that flavoured milk containing coconut extract is less stable to acidity than normal flavoured milk, which is because coconut protein is less stable to heat and pH levels than milk proteins (Raghavendra and Raghavrao 2010).

Microbial analysis

Total plate count

Changes in microbial counts were of interest because it gives us an idea of spoilage of the product. Hence, coconut flavoured milk was packed in PET bottles and stored at 6-8oC and changes in microbial counts were recorded. The counts are presented in Table-5. The initial TPC was 20000-22000 which increased to 35000. There was significant difference (P< 0.05) in increase in total plate counts of control pasteurized flavoured milk sample throughout the storage period. The total plate count of pasteurized flavoured milk with coconut extract was observed to be lower than the control pasteurised sample.

Table 5 Microbial changes during storage of flavoured milk# with or without coconut extract

Day	TBC (Cfu/ ml)		Yeast & mold (Cfu/ml)		Coliform (Cfu/ml)	
	Sample	Control	Sample	control	Sample	Control
0	20000	22000	<10	<10	<10	<10
2	20000	23000	<10	<10	<10	<10
4	23000	23000	<10	<10	<10	<10
6	24000	28000	<10	<10	<10	<10
8	31000	35000	<10	10	<10	<10

There was significant difference (P< 0.05) observed between control and flavoured milk with coconut extract during storage.

Yeast and mold counts

No growth of yeast and mold was observed in pasteurised flavoured milk with coconut extract and without coconut extract throughout the storage period at 6 - 8° C in pasteurization of flavoured milk. (Antunes *et al*. 2014)

Coliform counts

No growth of coliform was observed in the pasteurized flavoured milk with coconut extract and without coconut extract throughout the storage period at 6 -8°C even when agar plates were incubated for longer period (72 h); it showed proper pasteurization of the product and no post pasteurization contamination. In this context, it may be noted that the three medium chain fatty acids in coconut fat i.e. lauric acid (50–53%), caprylic acid, and capric acid, possess antimicrobial property, even against coliforms and yeast and mold (Ogbolu *et al*. 2007).

CONCLUSION

Optimum flavour was found at 10% level of pure coconut extract or 70% skim milk coconut extract or 17% of aqueous coconut extract. Among different fat levels (1.5, 3.0 and 4.0 %), 4% fat level was most acceptable. Among different sugar levels (6.0, 8.0 and 10.0 %), 8% sugar level was most acceptable. The flavour of the optimised product increased by the aging at refrigeration temperature. Product was less stable to the retort processing. The product had higher amount of lauric acid as indicated by GC analysis. There were less changes in the free fatty acids during storage.

References

Amador-Espejo GG, Suàrez-Berencia A, Juan B, Bárcenas ME, Trujillo AJ (2014) Effect of moderate inlet temperatures in ultra-high-pressure homogenization treatments on physicochemical and sensory characteristics of milk. *J of dairy sci* 97(2); 659-671.

Amarasiri WA, Dissanayake AS (2006) Coconut fats. *Ceylon Med J* 51(2): 47-51

Antunes AEC, e AlvesAS, Gallina DA, Trento FKHS, Zacarchenco P B, Van Dender AGF, Spadoti LM (2014) Development and shelf-life determination of pasteurized, microfiltered, lactose hydrolyzed skim milk. *J of dairy sci* 97(9); 5337-5344.

Appaiah P, Sunil L, Kumar PP, Krishna AG (2014) Composition of coconut testa, coconut kernel and its oil. *Journal of the American Oil Chemists' Society* 91(6); 917-924.

Khuenpet K, Jittanit W, Hongha N, Pairojkul S (2016) UHT skim coconut milk production and its quality. In: SHS Web of Conferences (Vol. 23). EDP Sciences

Lee WJ, Lucey JA (2010) Formation and physical properties of yogurt. *Asian-Australasian J. Anim. Sci*, 23(9): 1127-1136.

Mini S, Rajamohan T (2004) Influence of coconut kernel protein on lipid metabolism in alcohol fed rats. *Indian J. Exper Boil* 42: 53-57

Ogbolu DO, Oni AA, Daini OA, Oloko A P (2007) In vitro antimicrobial properties of coconut oil on Candida species in Ibadan, Nigeria. *J. Med. Food*, 10(2): 384-387

PaniappanS. (2002). The mystery behind coconut water. The Hindu. Retrieved on January 16

Pathare PB, Opara UL and Al-Said FAJ (2013) Colour measurement and analysis in fresh and processed foods: a review. *Food BioprocTechnol*, 6(1): 36-60

Pedreschi F, Moyano P, Kaack K. Granby K (2005) Color changes and acrylamide formation in fried potato slices. Food Res. Int., 38(1): 1-9

Raghavendra SN, Raghavarao KSMS (2010) Effect of different treatments for the destabilization of coconut milk emulsion. *J. Food Eng*, 97(3): 341-347

Rattanathanalerk M, Chiewchan N, Srichumpoung W (2005) Effect of thermal processing on the quality loss of pineapple juice. *J. Food Eng*, 66(2): 259-265

SeowCC, Gwee CN (1997) Coconut milk: chemistry and technology. *Int. J. Food Sci.Technol*. 32: 189-201.

Simuang J, Chiewchan N, Tansakul A (2004) Effects of fat content and temperature on the apparent viscosity of coconut milk. *J. Food Eng*. 64(2): 193-197.

Siriwongwilaichat P, Winger R J (2004) Technical knowledge for food product innovation in Thailand. Agribusiness. 20(3): 233-252.

Snedecor GW, Cochran W G (1994) Statistical methods, 8th edn. Affiliated East. *West Press, New Delhi, pp* 1467-1473

Tangsuphoom N, Coupland JN (2005) Effect of heating and homogenization on the stability of coconut milk emulsions. *J. Food Sci*. 70(8): e466-e470.

Tarrago-Trani MY, Phillips KM, Lemar LE (2006) New and existing oils and fats used in products with reduced trans-fatty acid content. *J. Acad. Nutr. Diet*. 106 (6): 867-880.

Thitima P, Naphaporn C (2006) Effect of fat content and preheat treatment on the apparent viscosity of coconut milk after homogenization. *J. Food Eng*. 77: 653-658.

Timmen H, Patton S (1989) Milk fat globules: fatty acid composition, size and in vivo regulation of fat liquidity. *Lipids*, 23: 685-689.

Tinchan P, Lorjaroenphon Y, Cadwallader KR, Chaiseri S (2015) Changes in the profile of volatiles of canned coconut milk during storage. *J of food sci*, 80(1).: C49-C54

Waisundara VY, Perera CO, Barlow PJ (2007) Effect of different pre-treatments of fresh coconut kernels on some of the quality attributes of the coconut milk extracted. *Food Chem*., 101(2): 771-777.

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