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Research Article

Development and Evaluation of Cinnamon Flavored Buttermilk

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ABSTRACTS

Cinnamon flavored Butter Milk was developed by addition of Cinnamon powder in Butter milk and investigating the proximate quality, textural characteristics, keeping quality and sensory attributes of the developed product. In our study carried out the variation in moisture, protein, fat and ash content, P^H, Acidity and Specific Gravity. When compared to normal butter milk (without cinnamon) significant changes were observed in Cinnamon flavored Butter Milk. The organoleptic studies appearance, color, flavor, taste, mouth feel and overall acceptability were studied and overall acceptability was good for Cinnamon Flavored Butter milk. Furthermore we studied microbial studies such as total plate count (TPC), yeast and mould count, coliform and E.coli to evaluate the safety and keeping quality of the products. Antioxidant and iron chelating activity of the Cinnamon Flavored Butter milk was also determined. The Shelf life of Cinnamon Flavored Butter Milk was better compared to normal buttermilk and recommended for market exploration.

KEYWORDS: Cinnamon Flavored Butter Milk, Organoleptic studies, Antioxidant Properties, Cinnamon

INTRODUCTION

Buttermilk is a one of the mostly used byproduct of the milk which is prepared by churning of cream in butter making process. This contains lipids, proteins and vitamins which are water soluble [1]. Currently various types of buttermilk preparation methods are available in the world. In the areas of Indian subcontinent the buttermilk is known as Traditional Buttermilk. In these areas buttermilk is prepared from curd. Buttermilk is very useful in the digestive problems and the diseases associated with the digestion [2].Very rich source of Potassium, Calcium, Phosphorus, VitaminB12, & Riboflavin were present in buttermilk and it is a good aid digestive problem [3].

Cinnamon (*Cinnamomumverum*, synonym *C. zeylanicum*) is a small tree, with a 10-15 meters (32.8-49.2 feet) height and family Lauraceae. It is a native to Sri Lanka and South India [6]. *Cinnamon* contains very potent components such as essential oils, resinous compounds, Cinnamic acid, Cinnamaldehyde and Cinnamate. Essential oil such as trans-cinnamaldehyde, caryophyllene oxide, L-borneol, L-bornyl acetate, eugenol, b-caryophyllene, E-nerolidol, and cinnamyl acetate the essential oil of *Cinnamon* has anti-microbial properties. The components which are present *Cinnamon* are used in the preservation of certain foods. It has been reported to have remarkable pharmacological effects in the treatment of type II diabetes. *Cinnamon* has traditionally been used to treat toothache and fight bad breath and its regular use is believed to stave off common cold and aid digestion [7].

MATERIALS AND METHODS

Toned milk Procured from Standard Company, Salt, Cinnamon powder were used as raw materials in the study.

Preparation of curd from milk

Curd was Prepared by traditional method, toned milk was taken and heated and boiled for few minutes and the cooled

to room temperature (30-35C), after which inoculation of culture that is house hold curd at the rate of 1-2 % was added and incubated at 37 C for 16-18 h after formation of curd it was cooled under refrigerationtemperature of 5°C [8].

Preparation of butter milk from curd:

Butter milk was prepared with 1: 3 ratio curd and water and to achieve a uniform texture it was homogenized and then filtered to remove the butter fat resulted during churning process.

Preparation of cinnamon powder

Cinnamon sticks were shade dried and pulverized to a coarse powder, then made into fine powder with the help of blender after which the powder was sieved through 4mm mesh to get very fine Cinnamon powder.

Analyses

Sensory evaluation of the cinnamon flavored buttermilk by QDA method:

QDA may be used to completely describe the sensory sensations associated with a product from Initial visual assessment to after note taste, or the analysts may be instructed to focus on a narrow range of attributes such as texture descriptors .

During QDA sessions, 10-12 judges are exposed to many ossible variations of the product to facilitate accurate concept formation. The product evaluations are performed by each judge individually, usually while seated in isolated booths. The resulting data can be analyzed statically using analysis of Variance and Multi Variatestastical Techniques [9].

Physico – chemical analysis of the cinnamon flavored buttermilk:

Cinnamon flavored butter milk was analyzed for pH, total soluble solids, titratable acidity, protein and fat and minerals for fresh samples as well as during storage to see the effect of storage on its chemical composition.

The pH measurement was made using a digital pH-meter calibrated with pH 4 and 7 buffers. Titratable acidity was measured by titrimetric method, and expressed as percent of lactic acid. Specific gravity, conductivity and viscosity were determined by the standard methods (AOAC, 2000) [10].

Lactose content was determined by using Fehling's solution method [11]. The ash content was obtained by incineration of the sample placed in the muffle furnace at 550 °C for 6 h (AOAC, 2000). For minerals analysis, the milk solid contents were taken and digested using two volumes of concentrated nitric acid. After adding one volume of perchloric acid, the contents were heated gently on a hot plate followed by a vigorous heating till dryness. This digestion technique makes no attempt to dissolve any silicate-based material that may be present in the samples. After cooling, the digested samples were quantitatively transferred to a flask and diluted to 100 ml with deionized double distilled water and then filtered. Atomic absorption spectrophotometer equipped with standard burner, air-acetylene flame and hollow cathode lamps, as radiation source, was used for the analysis of minerals.

Protein content of the cinnamon flavored Buttermilkwas determined using the micro Kjedahl method (AOAC, 1990) , the percentage of total soluble solids were determined by using "Erma" hand refractometer and expressed as percent total soluble solids (° brix). Reducing sugars and total sugars were determined by the method of "Lane and Eynon" [12].

Microbiological evaluation of the cinnamon flavored buttermilk

Microbiological studies were conducted for fresh at first, third, fifth and seventh day of storage. Tests for Total plate count (TPC), yeast and mould count, coliform and E.Coli were done. The procedure of Cruick Shank et.al, (1975) was used for total plate count and yeast and mould count.

Sedimentation

A fixed volume of milk was taken and filter through a screen made of lintine paper which has been mounted in the base of a large funnel. The filter is held in place by a bushing and by the funnel being tightened into place with a ¼ turn. The bushing used to test liquid milk is a set of two plastic rings: one serves as a bottom washer and the other ring comes with a small hole (aperature) in the center. The filter / filter card is held in place between these 2 rings. The size of the aperature is determined by the volume of milk that will be tested: 1, 2, 4 or 16 oz. The filter can be a simple disc of lintine paper or it can be a disc mounted in a card (Sediment Tester Card) that allows you to record all the necessary information for that milk sample and provides a convenient storage for your records.

Shelf life study of cinnamon flavored butter milk

The prepared Buttermilk was stored cold storage (5-10°C) to study the shelf life. The buttermilk samples developed were assessed every alternate day. The qualities considered during the study were Organoletic, Physico chemical and Microbiological.

Antioxidant activity of cinnamon flavored buttermilk

The scavenging of DPPH free radical of the samples was measured using the method of McCue and Shetty[13] with some modifications. A 0.1 mM DPPH radical solution in ethanol was prepared. 8ml of ethanolic DPPH solution was mixed with 2ml of sample or ethanol (as control), vortexed well, and then incubated for 30 min at room temperature. The samples were then centrifuged for 10 min at 9500 rpm at room temperature. After filtration through a Whatman No 40 filter, absorbance of each sample at 517 nm was measured. Trolox at a concentration of 0.25 mg/ml was used for comparison. Radical-scavenging activity was calculated as follows:

DPPH radical-scavenging activity (%) = (absorbance of control-absorbance of sample) / (absorbance of control) X 100

Chelation of metal ions (Fe2+)

Sample extracts were prepared according to Hernбndez-Ledesma et al. [14]. The chelating activity of samples on Fe2+ was measured according to El and Karakaya[15] with some modifications. Briefly, one millilitre of sample (1 g/ml) was mixed 3.7 ml deionized water. Each sample was incubated with 0.1 ml FeCl24H2O (2 mM) for 40 min. After incubation, the reaction was initiated by addition of 0.2 ml ferrozine (5 mM). The mixture was shaken vigorously and left at room temperature for 10 min. The absorbance of the mixture (formation of the ferrous iron-ferrozine complex) was measured at 562 nm. The control was performed in the same way using FeCl24H2O and water. The lower the absorbance of the reaction mixture means the higher the Fe2+ chelating ability. EDTA (0.1 mg/ml) was also run in the same way for comparison. The chelating activity was calculated using the following equation [16]:

Fe2+ chelating activity (%)= [1- (absorbance of sample / absorbance of control)] X 100

Statistical analysis

Analysis of Variance (ANOVA, proc mixed, SAS version 8.2, 2001) was performed to determine significant effects of the attribute intensities in each of the products. A significant F-ratio ($\alpha < 0.05$) from the ANOVA indicated that an attribute was used to find differences among the products. Multivariate Analysis of Variance (MANOVA) was used to determine differences among the products, expressed in terms of mean vectors of the sensory attributes. Descriptive Discriminant Analysis (DDA, proccandisc SAS version 8.2, 2001) was applied to identify sensory attributes that essentially emphasized differences among the products. When applying this technique, canonical coefficients are calculated.

RESULTS AND DISCUSSION

Preparation of Cinnamon flavored Buttermilk

Trails were done to assess the percent concentration of Cinnamon extract to prepare the cinnamon flavored butter milk .among different concentrations. Among 5, 10, 15, 20% Cinnamon extract tested, 10% was found to be ideal for Cinnamon flavored Butter milk preparation based on sensory evaluation. Normal buttermilk without adding Cinnamon was used as control sample.

Cinnamon flavored buttermilk

Figure 1: *Control*

Figure 2:*Cinnamon flavored Buttermilk*

Physico –chemical characteristics of butter milk

The physical characteristics such as moisture, total solids, specific gravity, pH, conductivity, viscosity and titratable acidity are important parameters in studying the physicochemical compositions and nutritional aspects of milk. **Table 1**shows the various physical parameters of the Masala Buttermilk. The initial values of the product before storage are presented in the **Table 1**.

Table 1:*Physico-chemical properties of different dietetic Butter milk*

Parameter	Observed Values
Ph	4.46
Acidity	0.20
Specific gravity	1.0313
Fat(%)	2.65±0.015
Protein(%)	3.75±0.012
Lactose(%)	5.10±0.025
Total solids (%)	14.33±0.037
Total ash (%)	0.54±0.006
Calcium (%)	0.18±0.006
Phosphorus (%)	0.15±0.008
Sodium (mg/100g)	48.36±0.019
Potassium (mg/100g)	127.55±0.159
Iron (µg/lt)	260.27±0.046
Sedimentation	0.1/0.2mg

Organoleptic evaluation of processed Butter Milk

The qualities considered during the study were appearance, colour, flavor, taste, mouthfeel and overall acceptability. Processed butter milk ranked excellent in all the qualities. Data pertaining to the initial organoleptic evaluation of the Milk are presented in **Table 2.**

Table 2:*Organoleptic characteristics of butter milk before storage*

Attributes	Herbal Milk
Appearance	12.4
Colour	12.5
Flavour	13.5
Taste	13
Mouth feel	12.8
Overall acceptability	13.5

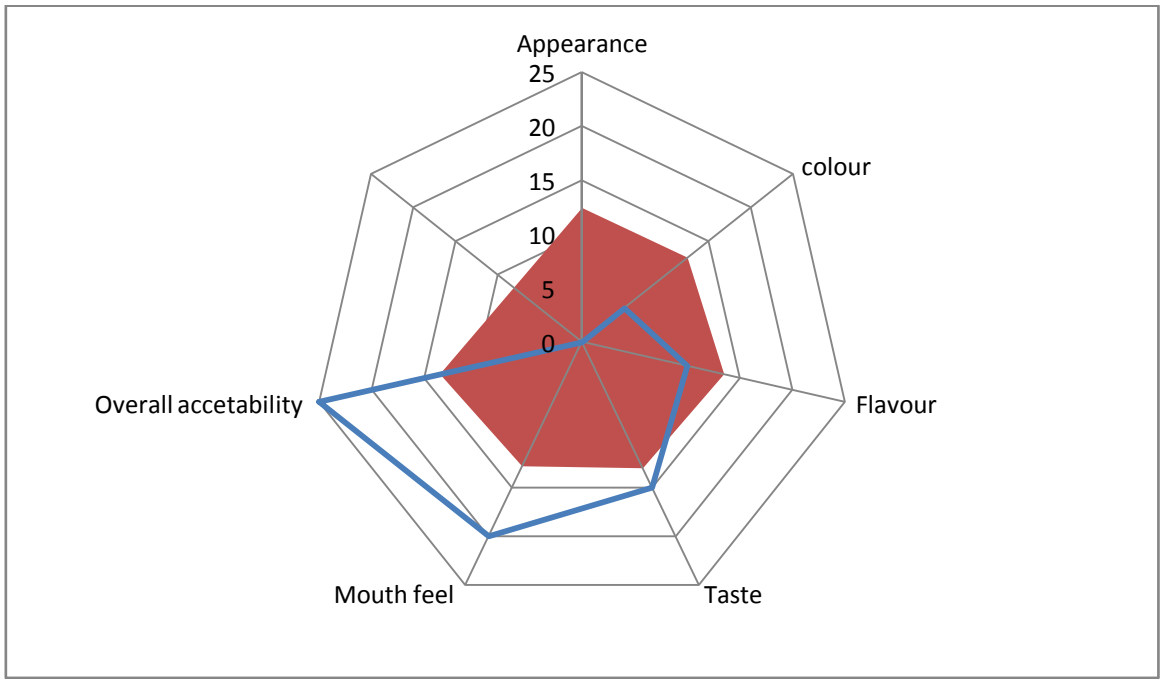

Figure 3:*Over all acceptability*

Microbial evaluation of processed butter milk

The products developed were analyzed initially for microbial quality. Microbial studies like total plate count (TPC), yeast and mould count, coliform and E.coli count were carried out to evaluate the safety and keeping quality of the products. Data pertaining to microbial evaluation of processed Masala Buttermilkpresented in **table3**.

Table 3:*Microbiological characteristics of Butter Milk and its products before storage*

Products	Total plate count (CFU/ml or g sample)	Standard Plate Count (CFU/ml)	Yeast and mould count (CFU/ml or g sample)	Coliform (CFU/ml)
Butter Milk	20	7800	15	70

AntiOxidant proeprty

DPPH method was used to study the Antioxidant and Iron chelating activity of the Cinnamon Flavored butter milk and the results were tabulated in **Table 4**.

Table 4:*Antioxidant properties of masala buttermilk*

Products	Activity	% of DPPH free radical Scavenging activity and iron chelating activity
Control	Anti-oxidant activity Iron chelating	40% 55%
Masala Butter milk	Anti-oxidant activity Iron chelating	55% 58%

CONCLUSION

The results of the study lead to the conclusion that the Addition of Cinnamon Bark powder in Buttermilk sufficiently developed a significant novel product. The qualities considered during the study were appearance, colour, flavor, taste and overall acceptability. Microbial studies like total plate count (TPC), yeast and mould count, coliform and E.coli count were carried out to evaluate the safety and keeping quality of the Masala ButterMilk. Antioxidant and Iron chealating activity of Masala Buttermilk was studied.

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