

Original Research Article

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## Effect of Cinnamon Powder Addition on Chemical Quality of Fresh Buttermilk

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### ABSTRACT

#### Keywords

Buttermilk,  
Spices, Cinnamon,  
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#### Article Info

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Buttermilk referred to the liquid left over from churning butter from cultured or fermented cream. It has been praised as an effective medicine for treatment of several diseases. It provides strength and vigour and makes a person (who consume it regularly) to live hundred years happily. But it has very short shelf-life. Spices have been used for not only flavour and aroma of the foods but also to provide antimicrobial properties. Cinnamon is a spice obtained from the inner bark of several tree species from the genus *Cinnamomum*. It is used mainly as an aromatic condiment and flavouring additive in a wide variety of cuisines, sweet and savoury dishes, breakfast cereals, snack foods, tea and traditional foods. Cinnamon can be used to increase the shelf of buttermilk. The present project was taken up to investigate the effect of cinnamon powder addition on chemical quality of fresh buttermilk. Addition of cinnamon into butter milk increase the total carbohydrate, fat, protein, ash, total solid, acidity and decrease the pH of buttermilk.

### Introduction

Buttermilk is the aqueous phase released during the churning of cream in butter manufacture. It has mild pleasing flavour resulting due to blending of acidic taste and delicate aromatic flavour and it should be free from off flavours like flat, metallic, yeasty or bitterness. It should have uniform thick consistency and should be free from churned particles and smooth texture is more preferred (Chandan, 2006). Buttermilk has been

mentioned as one of the best among milk products due to its immense therapeutic and nutritional value (Sarkar, 2008). Regular use of buttermilk immensely helps the jaundice and alcoholic liver patients to regain normal appetite and digestion (Trivedi, 1971; Anon, 2003). Fermented milk products have been observed to provide anticholesterolaemic effect (Thakur and Jha, 1981; Chawla and Kansal, 1983). Fermented milks have been considered as ideal food for promoting the development of dairy industry in developing

countries (Bachmann, 1985). Based on conversion of 6.5% of total milk production into creamery butter, it can be estimated that 3.2 million tonnes of buttermilk is produced annually as a by-product. Most of the curd is utilized for buttermilk making in India. Generally, most of these fermented milks have very short shelf-life.

Spices have been used for not only flavour and aroma of the foods but also to provide antimicrobial properties (Nanasombat and Lohasupthawee, 2005). Spices may contribute piquancy of food and beverages (Praveen and Nazia, 2006). The bark of various cinnamon species is one of the most important and popular spices used worldwide not only for cooking but also in traditional and modern medicines. Over all, approximately 250 species have been identified among the cinnamon genus, with trees being scattered all over the world (Vangalapati and Avanigaddu, 2012).

Cinnamon (*Cinnamomum zeylanicum*) comes from the bark of a small Southeast Asian evergreen tree and is available as oil, extract, dried powder or sticks. Its essential oils contain both antifungal and antibacterial principles that can be used to prevent food spoilage due to bacterial contamination (Fabio *et al.*, 2003). Cinnamon constituents possess antioxidant action and may prove beneficial against free radical damage to cell membranes (Dragland *et al.*, 2003).

Present study was conducted to investigate the effect of cinnamon powder addition on chemical quality of fresh buttermilk.

### **Materials and Methods**

The representative samples of buttermilk with cinnamon were analysed for the following chemical parameters

**Fat:** The fat content of milk and buttermilk with cinnamon were estimated by Gerber method (BIS, 1977).

**Protein:** Protein content of samples was determined by Kjeldhal method (AOAC, 2005).

**Carbohydrates:** The total carbohydrates were calculated by the “By – difference” method as described by AOAC (1990).

**Ash:** The Ash content of sample was estimated by the method of BIS (1981).

**Total Solids:** The total solid of buttermilk with cinnamon was determined by the Gravimetric method (BIS, 1981).

**Titrateable Acidity:** The titrateable acidity of buttermilk and buttermilk added with cinnamon were determined by the method described in (AOAC, 1995).

**pH:** Buttermilk pH was measured directly using a pH meter. The electrode assembly was calibrated against standard buffer of 9.2 and 4.0 pH.

### **Results and Discussion**

Cumin, cinnamon and black salt were added in buttermilk. In every treatment, level of black salt and cumin were constant, while the level of cinnamon in buttermilk was different (Table 1). Table 1 shows combination of spices at different levels in buttermilk.

**Total carbohydrate:** The effect of addition of cinnamon powder on the total carbohydrate content of buttermilk is shown in Fig 1. The lowest total carbohydrate content was 5.49 % in T<sub>0</sub> followed by 5.57 % in T<sub>1</sub> and 5.79 % in T<sub>2</sub>. The highest total carbohydrate content of 5.98 % was found in T<sub>3</sub>. From the results it can be seen that the addition of cinnamon

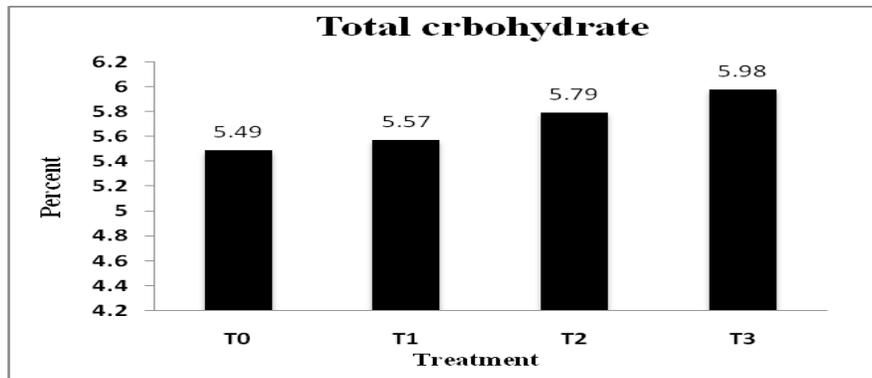
powder in buttermilk drastically increased the total carbohydrate content in the treatments from T<sub>1</sub> to T<sub>3</sub>. Buttermilk without addition of cinnamon powder (control sample) had the lowest total carbohydrate content. From the nutritional point of view, the inclusion of cinnamon powder in buttermilk improved the

total carbohydrate content. David (2015) reported that there were significant differences in total carbohydrate content among the treatments, when herbal shrikhand was prepared by addition with basil (*Ocimum basilicum*) extract.

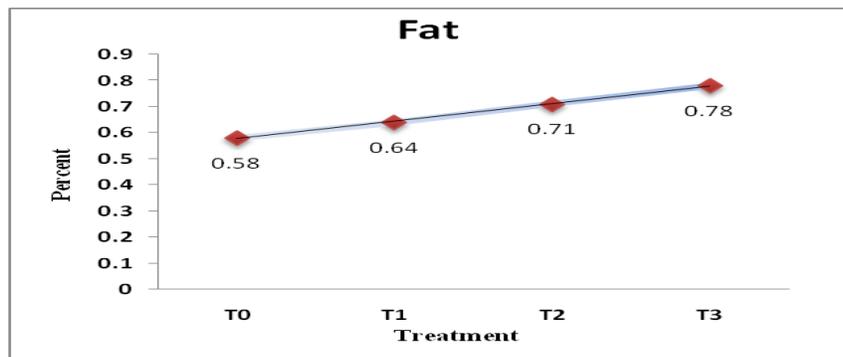
**Table.1** Combination of spices at different levels in buttermilk

Treatments	Buttermilk (%)	Cinnamon powder (%)	Black salt (%)	Cumin (%)
T <sub>0</sub> (Control)	99.2	0	0.4	0.4
T <sub>1</sub>	98.7	0.5	0.4	0.4
T <sub>2</sub>	98.2	1	0.4	0.4
T <sub>3</sub>	97.7	1.5	0.4	0.4

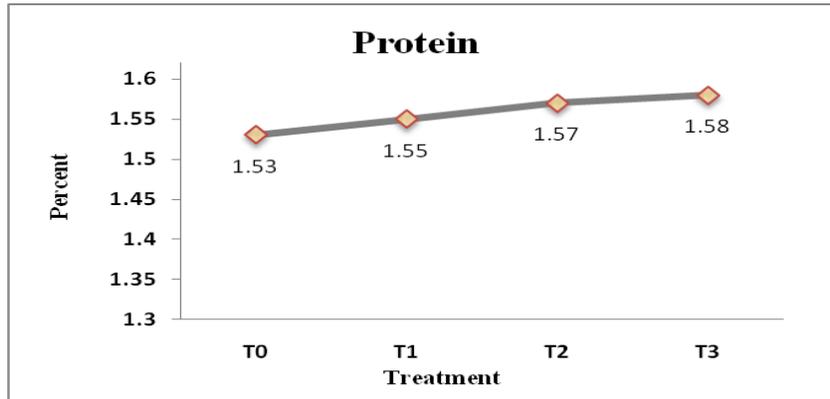
**Fig.1** Changes in total carbohydrate of buttermilk added with different level of cinnamon powder at refrigerated temperature (7 ±2°C)



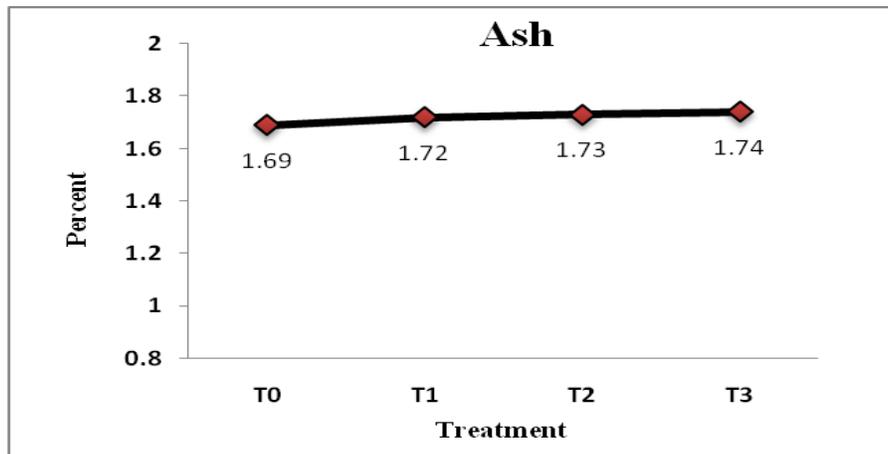
**Fig.2** Changes in fat of buttermilk added with different level of cinnamon powder at refrigerated temperature (7 ±2°C)



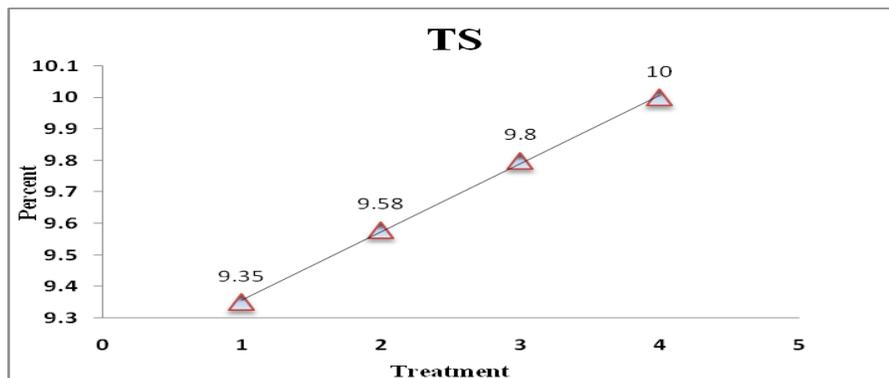
**Fig.3** Changes in protein of buttermilk added with different level of cinnamon powder at refrigerated temperature ( $7 \pm 2^\circ\text{C}$ )



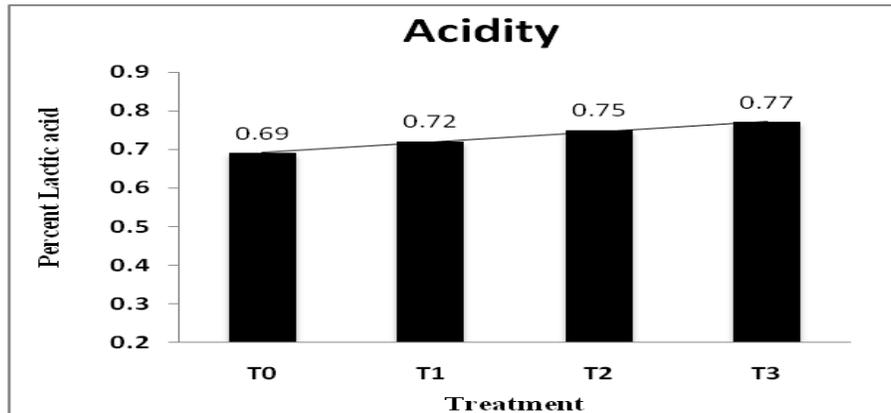
**Fig.4** Changes in ash of buttermilk added with different level of cinnamon powder at refrigerated temperature ( $7 \pm 2^\circ\text{C}$ )



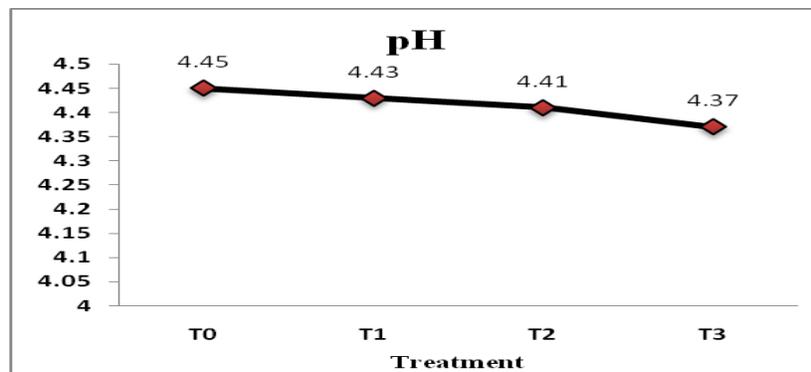
**Fig.5** Changes in TS of buttermilk added with different level of cinnamon powder at refrigerated temperature ( $7 \pm 2^\circ\text{C}$ )



**Fig.6** Changes in acidity of buttermilk added with different level of cinnamon powder at refrigerated temperature ( $7 \pm 2^\circ\text{C}$ )



**Fig.7** Changes in pH of buttermilk added with different level of cinnamon powder at refrigerated temperature ( $7 \pm 2^\circ\text{C}$ )



**Fat percentage:** The effect of cinnamon powder addition on the fat content of buttermilk samples is given in Fig 2. The fat content of buttermilk was 0.58 % for control sample (T<sub>0</sub>) which increased to 0.64% for T<sub>1</sub>, 0.71% for T<sub>2</sub> and 0.78 % for T<sub>3</sub>. The gradual increase was found in the samples as cinnamon was added to buttermilk at increasingly levels T<sub>3</sub>. The sample T<sub>3</sub> had the highest fat content in the cinnamon added buttermilk whereas the lowest fat content was found in the sample (T<sub>0</sub>). The increase in the fat content of cinnamon powder added buttermilk could be associated with the increased level of cinnamon powder addition. Johri *et al.*, (2014) studied the

physicochemical and organoleptic evaluation of *Misthi Doi* with different herbs (tulsi, cinnamon) were found that, there were significant difference within the fat content of different groups of *misthi dahi*.

**Protein percentage:** The effect of addition of cinnamon powder on the protein content of buttermilk is graphically represented in Fig 3. In the buttermilk, the highest protein content was found 1.58% in T<sub>3</sub>, while it was 1.57 % in T<sub>2</sub>, 1.55 % in T<sub>1</sub> and 1.53 % in T<sub>0</sub>. The results showed that the addition of cinnamon powder in buttermilk samples drastically increased the protein content in the treatments from T<sub>1</sub> to to T<sub>3</sub>. Buttermilk without addition of cinnamon

powder i.e. control sample had the lowest protein content. From a nutritional point of view, the inclusion of cinnamon powder in buttermilk improved the protein content. David (2015) also reported differences in protein content among the herbal shrikhand, when it was prepared by addition with basil (*Ocimum basilicum*) extract.

**Ash percentage:** The ash content of a food sample gives a reflection of the mineral elements present in it. The ash content of the buttermilk samples at different concentrations of cinnamon powder is given in Fig. 4. The average values of ash content found for the samples of T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were 1.69 %, 1.72%, 1.73% and 1.74%, respectively. In the cinnamon added buttermilk, highest ash content was found in the sample T<sub>3</sub> whereas lowest ash content was found in the sample T<sub>0</sub> (control). Similar observations were also obtained by Singh (2014) in ice cream incorporating mint and basil leaves.

**Total solid:** The total solids (TS) content in the buttermilk samples is shown in Fig. 5. The fresh samples of buttermilk T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> had TS content of 9.35%, 9.58%, 9.8% and 10.00% respectively. The TS content in the cinnamon added buttermilk progressively increased from T<sub>0</sub> to T<sub>3</sub>. The highest TS content was found to be 10.00 % in the sample T<sub>3</sub>. The lowest total solids content (9.35%) was found in the control sample (T<sub>0</sub>). The increase the total solids content in all the samples of buttermilk may be due to addition of cinnamon powder. Goraya *et al.*, (2013) had prepared ice cream by addition of amla powder and found that there was augmentation of total solid content of ice cream.

**Acidity:** The acidity of the fresh samples of cinnamon added buttermilk is given in Fig. 6. The average values of acidity of different samples T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were determined

and the corresponding values found to be 0.69 0.72, 0.75 and 0.77 % lactic acid respectively. The minimum titratable acidity was (0.69 % LA) in the control sample T<sub>0</sub>, whereas, the maximum TA was 0.77 % LA in the T<sub>3</sub> sample.

The acidity of the cinnamon added buttermilk samples increased with an increase in the concentration of cinnamon powder. This may be attributed to presence of more quantity of carbohydrate in sample T<sub>3</sub>. Johri *et al.*, (2014) studied the physicochemical and organoleptic evaluation of *Misthi Doi* with different herbs (*tulsi*, cinnamon) were found that, there were increase in acidity content of different groups of *misthi dahi*.

**pH:** The pH of fresh samples of buttermilk with cinnamon powder is shown in Fig. 7. The average values of pH of different samples T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were determined and the corresponding values were 4.45, 4.43, 4.41 and 4.37 respectively. The maximum pH of 4.45 was found in control sample. The increase in acidity ultimately decreases the pH, and the minimum pH of 4.37 was found in the experimental sample (T<sub>3</sub>).

In conclusion from above results, It can be concluded that the addition of cinnamon into butter milk increase the total carbohydrate, fat, protein, ash, total solid, acidity and decrease the pH of buttermilk.

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