

Original Research Article

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

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### ABSTRACT

#### Keywords

Buttermilk, Spices,  
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Buttermilk is “ready to serve” fermented milk product. Naturally occurring lactic acid-producing bacteria in the milk fermented it. Spices have been important to mankind since the beginning of history. Spices contain high amount of secondary metabolites which have high antimicrobial activity and hence can be used as good bio-preservative. The present study was taken up to investigate the effect of cinnamon powder addition on microbial quality of fresh buttermilk. Addition of cinnamon into butter milk decreases the total standard plate count, and yeast and mold count in buttermilk.

### Introduction

Buttermilk is a one of the mostly used by product of the milk which is prepared by churning of cream in butter making process. This contains lipids, proteins and vitamins which are water soluble (Hunziker, 1923). It has mild pleasing flavour resulting from a blend of clean acid taste and delicate aromatic flavour and it should be free from off flavours like flat, metallic, yeasty or bitterness. It is 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 (Mann and Sperry, 1974; Thakur and Jha, 1981; and Chawla and Kansal, 1983); they stimulate natural activities of the body cells and consequently strengthen the immune system. They also protect against urogenital infection, break down carcinogenic substances, provide relief from constipation and diarrhoeal disorders, lower serum cholesterol level, inhibit the mutagenicity of the intestinal

contents, reduce the incidence of intestinal tumor, inhibit decalcification of bones in elderly people and aid in the treatment of ulcer (Sarkar, 2002).

Spices have been well-known for their medicinal, preservative and antioxidant properties (Souza *et al.*, 2005). They are currently used mainly for enhancing the flavor of foods rather than extending shelf life (Almeida and Regitano, 2000). In addition to imparting flavor, certain spices prolong the shelf life of foods due to their bacteriostatic or bactericidal activity, and some prevent rancidity by their antioxidant activity (Shelef, 1984). Many plant essential oils of spices are active against various food borne bacteria and molds (Aureli *et al.*, 1992). Spices in general show antimicrobial activity due to phenolic component (Deans *et al.*, 1995). The ability of phenolics to interfere with cellular metabolism through a number of mechanisms (substrate complexing, membrane disruption, enzyme inactivation and metal chelation) is well known (Cowan, 1999). 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 *et al.*, 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. The word cinnamon comes from the Greek Kinnamomon (Maheshwari *et al.*, 2013). Cinnamaldehyde, the principle component of cinnamon oil, at 150 ppm inhibited the growth and toxin production of *Aspergillusparviticus* in candies and baked goods. Cinnamon has antimicrobial property against *Compylobacter jejuni*, *Salmonella enteritidis*, *E. coli*, *Staphylococcus aureus* and *listeria monocytogenes*. Present study was

conducted to investigate the effect of cinnamon powder addition on microbial quality of fresh buttermilk.

## **Materials and Methods**

The samples of buttermilk with cinnamon were analysed for the following microbial parameters.

### **Standard plate count**

The standard plate count in buttermilk was determined as per the standard procedure (APHA, 1992).

### **Yeast and mould count**

The yeast and mould count for buttermilk was determined by using procedure recommended by APHA (1992).

## **Results and Discussion**

In fresh buttermilk, cumin, cinnamon and black salt were added. In every treatment, percentage of black salt and cumin were constant, while percentage of cinnamon in buttermilk was different (Table 1). Table 1 shows combination of spices at different levels in buttermilk. The percentage of cinnamon powder was 0, 0.5, 1 and 1.5 in the T<sub>0</sub> (control), T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>.

### **Standard Plate Count (SPC)**

The effect of cinnamon powder addition on standard plate count of buttermilk is shown in Fig. 1. The average values of SPC of different samples T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> was determined were 4.49, 4.42, 4.38 and 4.35 cfu/g respectively.

The maximum SPC was 4.49 in the sample T<sub>0</sub>, while the minimum count of 4.35 was in the sample T<sub>3</sub>. The reduction in standard plate

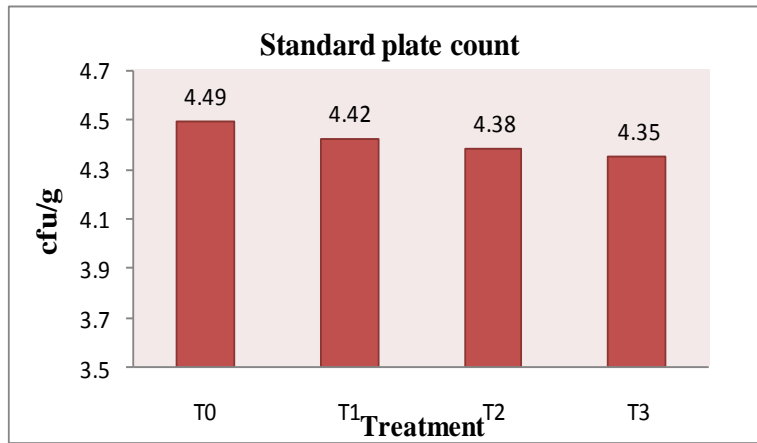
count in buttermilk may be due to antimicrobial property of cinnamon. Agaoglu *et al.*, (2007) reported the antimicrobial activity of cinnamon in meat products.

Vidanagamage (2016) found lower standard plate count in butter added with cinnamon extract.

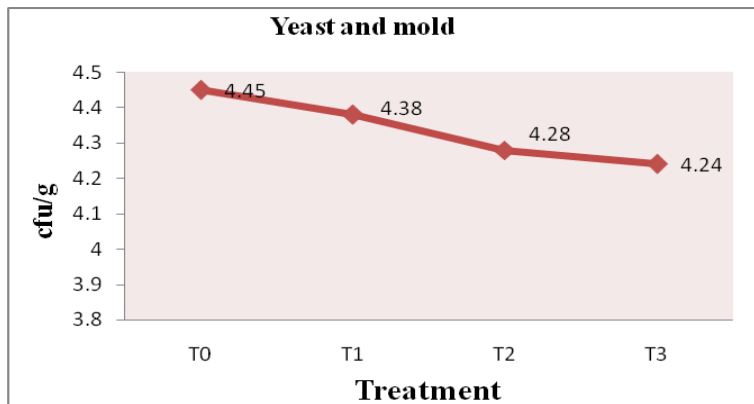
**Table.1** Combination of spices at different levels in buttermilk

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 standard plate count (cfu/g) of buttermilk added with different level of cinnamon powder



**Fig.2** Changes in yeast and mold (cfu/g) of buttermilk added with different level of cinnamon powder



## Yeast and mold count

The effect of cinnamon powder addition on yeast and mold count of buttermilk is shown in Fig. 2. The average values of yeast and mold in sample T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were 4.45, 4.38, 4.28 and 4.24 respectively. The maximum yeast and mold count found to be 4.45 in the sample T<sub>0</sub> (control), whereas, the minimum of yeast and mold count was 4.24 in the sample (T<sub>3</sub>). Vidanagamage (2016) reported lower yeast and molds count in butter added with cinnamon extract.

From above result it can be concluded that the addition of cinnamon into butter milk decrease the standard plate count (SPC) and yeast and mold count. Thus cinnamon powder can be used to enhance the shelf-life of buttermilk.

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