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## Effects of Cinnamon (*Cinnamomum verum*) extract on functional properties of butter

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### Abstract

Butter is a dairy product made by churning fresh or fermented cream or milk. It is generally used as a spread and as an ingredient in cooking purposes. The incorporation of natural ingredients with health benefits into butter is one way to increase its intake. The potential health benefits of cinnamon (*Cinnamomum verum*) derived primarily from bioactive ingredients such as antioxidants, polyphenols and flavonoids. The objective of the present study was to improve the quality of butter made from cream with the addition of cinnamon extract. Milk cream with 36% fat was churned at 10°C to maintain the fat at high level with low moisture content. Based on preliminary investigation, soxhlet extraction of cinnamon quills was carried out with 39% (v/v) ethanol. Butter was prepared by incorporating cinnamon extract into butter at 1, 3, and 5% (w/w). Sensory evaluation was done using 20 semi trained panelists based on 5 point hedonic scale. It was found that cinnamon extract can be incorporated in to the butter formulation up to 3% (w/w) without compromising the sensory attributes. It was subjected to further analysis with 1000 ppm potassium sorbate added butter. Changes in peroxide value, free fatty acids value and pH were monitored at weekly intervals. Microbiological studies (Total plate count and yeast and mold) were done at two weeks interval during two months storage period. Storage stability was tested at refrigeration (4°C) condition. Total phenolic content and free radical scavenging activity of the 3% cinnamon extract incorporated butter were 135.62±1.00 µg GAE/mg and 38.73±0.01% DPPH, respectively. The cinnamon extract incorporated butter has shown low levels of peroxide value, free fatty acids value and low microbial count when compared to ordinary butter (without adding preservative) and potassium sorbate added butter. Antioxidant activity of cinnamon extends the shelf life of butter. This study demonstrates the 3% cinnamon extract can be used to formulate an antioxidant rich butter and it can be placed as a natural preservative for preparation of butter.

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**Keywords:** Antioxidant; butter; cinnamon; peroxide value

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## 1. Introduction

Butter is widely used as a seasoning in cooking, suggesting that it plays an important role in the formation of flavors during heating<sup>1</sup>. Besides fats, butter contains small percentages of proteins, milk sugar and water which make it a suitable substrate for microorganisms<sup>2</sup>. Although butter spoilage is most often due to the development of chemical rancidity, microbiological problems do also occur in the form of cheesy, putrid or fruity odors and the rancid flavor produced by hydrolysis<sup>3</sup>. Many psychrotropic strains of bacteria, yeasts and molds have been implicated in spoilage and lipolysis of butter at temperatures below 5°C and some even below 0°C. Moreover, some pathogenic bacteria such as *Staphylococcus aureus* and *Listeria monocytogenes* remained recoverable in butter stored in low temperatures<sup>4</sup>. So, butter is one of the highly preserved conditions needed dairy product.

Spices are known to possess potential as natural agents for food preservation<sup>5</sup>. In addition, their components are gaining increasing interest because of relatively safe status, their wide acceptance by consumers, and their exploitation for potential multi-functional use<sup>6</sup>. Bioactive compounds commonly found in fruits, vegetables, herbs, and other plants have been shown to have possible health benefits with antioxidative, anticarcinogenic, atherosclerosis, antimutagenic, and angiogenesis inhibitory activities<sup>7</sup>.

Cinnamon (*Cinnamomum verum*) contains a number of antioxidant compounds which can effectively scavenge reactive oxygen species including superoxide anions and hydroxyl radicals as other free radicals<sup>8</sup>. Antimicrobial activity of cinnamon bark and oil is described against many bacterial and fungal strains. They are well known inhibitors of microorganisms. The cinnamon essential oils have been proved to inhibit the growth of molds, yeasts and bacteria<sup>9</sup>. Since, cinnamaldehyde is highly effective in inhibiting the growth of microorganisms with comparatively synthetic preservatives. Furthermore, it reduces the butter spoilage from development of chemical rancidity and fat degradation produce by hydrolysis. Food and Drug Administration of U.S.A. has approved cinnamaldehyde as a safe food additive due to its special flavor and other functional properties.

As a result of nutritional and functional properties of cinnamon, it is extensively used in production of diverse food items. Cinnamon is predominantly employed in cuisine as a condiment and flavoring material. Cinnamon can be used in pickling. It is also used in various dessert recipes, such as apple pie, doughnuts and cinnamon buns in addition to spicy candies, tea, hot cocoa and liqueurs and cinnamon powder is used in variety of thick soups, beverages and candies. Accordingly, there is an opportunity for researches to modify the formulation of butter idyllically deprived of any major loss of the inherent sensory attributes. Furthermore the dairy products industry is examining to sustain its competitiveness investing in value added novel products and developments. Hence a butter prepared with cinnamon would be an applicant functional food due to the health promoting properties of cinnamon

The aim of this study was to formulate a Cinnamon incorporated butter with higher consumer acceptability. Another objective of this study was to evaluate the effect of Cinnamon additive on sensory, chemical and microbiological properties of the butter.

## 2. Materials and methods

This research was carried out in the laboratory of Department of Food Science and Technology of Wayamba University of Sri Lanka. Fresh cream samples were purchased from a local market at Negombo.

The cream was analyzed for different physicochemical parameters to assess the quality of raw cream. All the values were obtained as three replications. The cream was pasteurized by heating it at 72°C for 30 minutes. Pasteurized cream was kept in refrigerator overnight for aging process. Cream samples were subjected to cold water bath to maintain the appropriate churning temperature (10°C). Salt (0.5%) was added to the butter samples. Then three butter samples were prepared with different cinnamon extract levels 1, 3 and 5% w/w. Butter samples were packed and stored at 4°C temperature in refrigerator. Organoleptic evaluations were carried out and the most acceptable sample was selected. Most acceptable level of cinnamon extract and K Sorbate (1000 ppm) were added separately to prepare three different butter samples for comparison of the storage studies with the reference sample. Salt was kept constant in all formulas.

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