

The Effect of Activated Carbon Using on Aroma and pH Values in Yogurt Fermentation

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Abstract

Yogurt is a known food item all over the world. Consuming yogurt can be quite difficult for people with lactose intolerance at times. In addition to its active carbon adsorbent feature, it is a lactose chelate. It is aimed to use yoghurt prepared by using activated carbon for nutritional purposes. For this purpose, aroma and pH changes in yogurt made with activated carbon compared to classical yogurt production were studied. It was determined that the active carbon usage method used in the study did not cause any aroma change in yoghurt, however, it increased the pH. This result makes us think that the microorganisms that carry out the fermentation of yogurt have difficulty in accessing lactose. The factor that does this is activated carbon, which is the only variable in our study. Yoghurt with activated carbon can be an alternative to lactose-free yogurt consumption in individuals with lactose intolerance.

Keywords: Yoghurt, Activated Carbon, pH, Aroma, Lactose Intolerance

Introduction

It was very important to keep the milk intact and usable for consumption when there was no refrigerator. For this reason, people have produced milk derivatives such as cheese and yogurt to preserve the nutritional values of milk without spoiling.

Yogurt contains chemicals similar to milk, but differences occur because of fermentation [1]. The pH of the yogurt formed is an important factor in the preservation of the yogurt as well as its aroma. The beneficial microorganisms found in yogurt have probiotic properties, adding a distinct positive feature to yogurt [2-4]. However, lactose in yogurt limits the use of this valuable product in individuals with lactose intolerance.

Microorganisms that can ferment yogurt also use lactose as a food source. Lactose molecules leftover from this use can be a potential factor for creating lactose intolerance. The lactose used leads to the formation of lactic acid in the media [2]. The formation of lactic acid ends with a decrease in pH. Recently, activated carbon used in foods, toothpaste, and soaps has also been mixed with yogurt.

Activated carbon is the general name of carbon adsorbents with a developed pore structure and large inner surface area. Activated carbon is a local antidote that adsorbs a large number of xenobi-

otics. It is increasingly used in many emergency care units as the first and only attempt to remove the poisoning agent [5]. Studies have also been carried out as lactose chelate with activated carbon.

Methods

In this study, the aroma evaluation was conducted by measuring the pH in the 1st and 7th days of the make yogurt, which was produced by fermentation of milk with an active carbon additive.

In the study, pasteurized milk (obtained from Çukurova University dairy products market) was heated to 55 degrees in a sterilized 5 L steel pot. Then 2 grams of activated carbon was added to it (Activated carbon produced for human health purposes was obtained from the pharmacy). The milk was homogenized by gently centrifuging 10 times in a clockwise direction with the help of a sterile stick. Then the milk was filtered 2 times through filter paper. 300 mL of activated carbon added milk was added into sterilized 425 mL glass jars. The milk was fermented under sterile conditions with a sample taken from another yogurt (provided from Çukurova University dairy products market) at a temperature of 45°C. Then, the lids of the jars were closed and kept at 25 degrees for 6 hours. Then they were kept at +4 degrees without opening their caps.

The aroma [6] and pH [7] levels of yogurt were tested in the samples taken from the yogurts on the 1st and 7th days. In statistical analysis, the Mann Whitney U test was used for aroma comparison and the Student T-test was used for pH levels (SPSS 17).

Results

The pH values obtained from the results are given in the followed table. No statistical difference was detected in the senses of smell and taste on the 1st and 7th days ($p > 0.05$).

The result of this study shows us that the acidity level of the yogurt decreases and the activated carbon increases the pH of the yogurt with the active carbon additive used while fermenting the yogurt.

Table 1: The effects of activated carbon on the pH alterations

	pH ± standard deviation	P-value
First day of standard yogurt	4.50±0.01069	p<0.001
First day of yogurt with activated carbon	4.53±0.01069	
7th day of standard yogurt	4.44±0.01604	p<0.005
7th day of yogurt with activated carbon	4.47±0.1773	

Conclusion

The relationship between pH level and lactic acid in yogurt is known. These results suggest that lactic acid, a lactose breakdown product, was reduced by activated carbon. The high pH of the yogurt with added activated carbon was also found to be compatible with the study setup. The fact that there is no change in flavors in yogurt with activated carbon is a positive advantage for using activated charcoal in yogurt as lactose chelate. The lack of absorption of activated carbon from the gastrointestinal tract supports the idea that activated carbon can be used more safely when fermenting yogurt. This study suggests that people with lactose intolerance or gastrointestinal complaints due to acidity can use nutritious yogurt more safely.

In a different study, it was observed that activated carbon added to milk did not change the properties of yoghurt formed because of fermentation [8]. At this stage, we think that some of the important

factors are pH and aroma changes. These studies are in agreement with our study.

For individuals with lactose intolerance, yogurt with activated carbon can be an alternative to lactose-free yogurt.

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