Research Article

Influence of Storage on Microbial Content of Value added Shrikhand

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Abstract

Shrikhand is a semi-soft, sweetish-sour milk product prepared from lactic fermented curd. Value added shrikhand was developed by incorporation of whey protein concentrate and beetroot powder at 3 and 0.5% respectively. The microbial growth increased by 18%, 25% and 49% for control on 7th, 15th and 21st day of storage. Similarly the value added shrikhand had an increase of 16% on 7th day, doubled by 15th day and increased by 3 times on 21st day. The yeast and moulds were absent in both samples on 0th day. The yeast and moulds appeared on 7th day and gradually increased by 21st day of storage for both samples even under refrigeration. On 21st day of storage, yeast and moulds count in value added shrikhand increased from 0.00 to $9.25x10^1$/gram where as it was $5.50x10^1$/gram for control sample at refrigeration temperature. Coliforms were detected in both the sample by day 21 whereas E. coli were not detected on 21st day also.

Keywords: Fermented products, yoghurt, value added shrikhand, *Lactobacillus lacti*, shelf life of shrikhand

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Introduction

Food provides a favourable environment for the growth of micro organisms. Yeasts, moulds and a broad spectrum of bacteria grow in milk at temperatures above 16°C [1]. These microbes can enter milk via the cow, air, feed, milk handling equipment and the milker. Once micro organisms get into the milk their number increases rapidly due to conducive environment. It is more effective to exclude micro organisms than to try to control microbial growth once they have entered the milk [2]. The microbial growth in milk and milk products is mostly dependent on the temperature, nutrient availability, water supply, oxygen supply and acidity of the medium [3]. Fermented milk products are produced as milk is a highly perishable commodity [4].

The staple desert and a fermented milk product, "Shrikhand" was obtained from chakka to which fruits, nuts, sugar, saffron and other spices can be added [5]. Shrikhand is known for its high nutritive, characteristic flavour, taste, palatable nature and possible therapeutic value. It is very refreshing particularly during summer months and is recommended for people with obesity and cardiovascular diseases as it have low fat content [6]. The Sapota pulp blended shrikhand spoiled within 4 days at room temperature whereas it was acceptable up to 8 days when stored at 4±1°C [7].

Material and Methods

Value addition to WPC added shrikhand with beet root powder

The 3% WPC and 0.5% beet root powder added shrikhand was found to be most acceptable product [8]. The microbial count was done by taking selective *Salmonella* agar base of 54.0 g and EMB agar of 35.96 g were dissolved in 1.0 ml of distilled water, sterilized at 15 psi and 121°C for 15 min, was cooled to 45-50°C and aseptically poured into sterile petri plates to enumerate *Salmonella sp*. and *Escherichia coli* [9].

Results and Discussion

This study delineates the microbial quantification using total plate count (TPC), total mold count (TMC), coliform count (CC) and for the presence of *Escherichia coli*. The control and value added shrikhand sample were analyzed on 0th, 7th, 15th and 21st days of storage and the results are given in the table below.

Table 1 Microbial quality characteristics of value added shrikhand

Treatment	Duration (Days)	TPC (Log cfu/g)	TMC (Log cfu/g)	Coliform (cfu/g)	*E. coli*
Control	0	1.45^{a}±0.03	0.0	ND	ND
	7	1.71^{a}±0.05	1.25	ND	ND
	15	1.81^{a}±0.05	3.25	ND	ND
	21	2.16^{a}±0.03	5.50	3.0	ND
SWB	0	1.55^{b}±0.64	0.0	ND	ND
	7	1.80^{b}±0.64	2.50	ND	ND
	15	3.12^{b}±0.64	6.25	ND	ND
	21	5.12^{c}±0.83	9.25	5.0	ND

Values are expressed as mean ± standard deviation of three determinations.
Means within the same column followed by a common letter do not significantly differ at $p \leq 0.05$.
SWB: Control + 3% WPC+ 0.5 % beet root powder
ND: Not detected

TPC

The initial day TPC was low in both control and value added shrikhand samples but gradually increased over the period of storage and was not significant ($p \leq 0.05$).

The mean TPC values for control was 1.45±0.03 log cfu/g and value added shrikhand was 1.55±0.64 log cfu/g on the initial day of refrigeration. The microbial growth increased by 18%, 25% and 49% for control sample on 7^{th}, 15^{th} and 21^{st} day of storage. Similarly for value added shrikhand, it increased by 16% on 7^{th} day, doubled by 15^{th} day and increased by 3 times on 21^{st} day. Hence the value added shrikhand cannot be stored for that longer than 15 days. The increase in TPC was more in value added shrikhand than the control sample may be due to the addition of whey protein concentrate and beet root powders that makes the nutrients more available.

The mean TPC values increased during refrigerated storage in milk nuggets [10], Kashmiri saffron phirne from reconstituted skim milk [11] and apple pulp incorporated shrikhand [12].

Coliforms

The coliforms were not detected in control and value added shrikhand upto 2 weeks of refrigerated storage. But by the third week, coliforms were detection in both samples. They were within permissible limits.

Total Mould Count (TMC)

The presence of yeast and molds at storage interval was expressed as 10^{1}/gram for both control and value added shrikhand on 0^{th}, 7^{th}, 15^{th} and 21^{st} days as tabulated in the table 6. The yeast and moulds were absent in both samples on 0^{th} day. The yeast and moulds appeared on 7^{th} day and gradually increased by 21^{st} day of storage for both samples even under refrigeration. On 21^{st} day of storage, yeast and moulds count in value added shrikhand increased from 0.00 to 9.25×10^{1} /gram where as it was 5.50×10^{1} /gram for control sample at refrigeration temperature. Borate also observed that the yeast and moulds count increased during storage and the rate of increase was faster at room temperature than under refrigeration [13]. The yeast and moulds of shrikhand was more as these microorganisms grow at lower pH and water activity created by high sugar concentrations [14].

According to Prevention of Food Adulteration Act (2009), the TMC should not be more than 50,000/g for shrikhand. Results of control and value added shrikhand at refrigeration temperature were within the prescribed limits. Presence of congenial condition such as developed acidity and sufficient moisture in shrikhand supported the growth of yeast and mould during storage [15].

Apart from the TPC and TMC the presence of harmful food pathogen *E. coli* was tested. The absence of these bacteria in both control and value added shrikhand indicated that there was no possible source of contamination during the preparation process and throughout the refrigeration period.

Contamination by disease causing micro organisms can occur at any point in the food-handling sequence. Infections like septic sore throat, scarlet fever and food poisoning has been traced to the consumption of milk products [16]. The detection and control of pathogens and food spoilage micro organisms are important aspects to be determined during storage [17].

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