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Analysis of Traditional Turmeric Milk Concentrations in Intensifying Shelf life of Raw Milk through Physiological, Microbiological and Biochemical Parameters.

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Abstract

The raw milk sample collected directly from cow through milk man may be contaminated with microbes through various sources. The present work holds systems thinking which collaborate the studies on shelf life of milk through physiological, microbiological and biochemical parameters. Various turmeric concentrations on the milk sample presented preservation for raw milk at 0.1gm for 50ml of sample taken. MBRT test revealed that the milk sample with 0.1gm of turmeric can be kept for 2.30 hours without any alteration in its quality and is proved to be a vital technique in the absence of any refrigerated conditions. The SPC presented very few colonies which were less than 30 considering the standard plate count value of 30-300. The sample was assayed for its bacterial load was found to be Gram positive in nature. Biochemical test for identification of bacteria predicted the presence of Lactobacillus species which was found to be active after the time interval of preservation.

Keywords: Turmeric, Milk, Shelf life, MBRT, Biochemical, Microbiological.

Introduction

Milk is considered to be a unique secretion of mammary glands, with all the essential nutrients that enriches and fulfill the nutritional requirements of offsprings. Chemically, milk is considered to be constituted of more than 100 separate entities that varies within species. Milk is considered to be an opaque white fluid having various constituents in a colloidal suspension or solution upon a physical point of view. The physicochemical behavior and chemical makeup provides an explanation and forms the basic criteria for milk processing and its by products. Milk that draws from any animal is considered to be sterile, without any bacterial content. The need for safety measures to keep it sterile starts from the point it leaves the udder of animal.

Microorganisms that are capable of contaminating milk are prevalent in nature making it unsuitable for processing and unfit for consumption. There is the traditional practice of boiling the raw milk within hours of production which provides safety but not minimizing the microbial load. Increasing raw milk storage time prior to pasteurization may affect product shelf life. Raw milk was stored at 4.5°C for 0, 2, 4 and 6 days prior to pasteurization. Milk samples from each pasteurized lot were analyzed after continuous storage at 4.5°C. The raw and pasteurized samples were analyzed for coli forms, psychotrophs and total bacteria count. Flavour scorer were also determined.

No correlation were significant between raw and pasteurized samples and total bacteria or coli form counts. Related were flavor score and days held raw. Psychotrophic counts and age of the raw milk were correlated from correlations of flavor scores with shelf life of milk a predictive equation is performed for analysis. (J J Janszen ,J R Bishop,1981). Species belongs to *Bacillus* has got a tremendous role in keeping quality of milk samples. The organism can survive high temperature which was used for processing of food samples.

Reducing substances formed by the microbes as their metabolites are the key reason behind the change in color formed by MBRT .The quicker disappearance of color is directly proportional to the total number of bacteria. This is a true indication of the total metabolic reaction proceeding in the surface of bacteria. Some may retain conventional pasteurization technique thereby extend the shelf life of milk through HTST Pasteurization techniques. The method may enable a shelf life of 14 to 28 days depends on the quality of raw milk samples prior to pasteurization. There is the second process which extends the shelf life through UP, Ultra pasteurization where the milk is heated to 280 °C for 2 seconds.

Turmeric holds multiple medicinal properties and is considered to be as a natural preservative. Turmeric milk is healthy and is considered to be as a golden remedy diet for many ailments. Curcumin, the polyphenol from turmeric is a good aid in controlling inflammation. Turmeric milk relieves joint pains .The natural preservative turmeric, is considered to be rich in antioxidants, which can protect your body from damages caused by free radicals. Turmeric holds the ability to control blood sugar levels and boost immunity as well as brain functions. The present work aims to assess the antibacterial property of turmeric that can preserve milk.

Materials and Methods

Methylene Blue Reductase test

After a prompt sterilization of all utensils, 1 ml of methylene blue was added to the test tubes which are followed by the addition of 10ml of milk. An incubation period of 10 minutes will be provided under 35 °C. A uniform creaming is created when temperature reached 36 °C with slow inversion of the tubes. Special precautions are followed, not to shake the tubes. The tubes were covered to keep out from

light. The samples were checked for discoloration after 30 minutes and subsequent changes were noted. The reduction time in whole hours between sample addition and discoloration were recorded.

Activity of Turmeric

Turmeric milk solutions of varying concentrations were prepared and the methylene blue reductase tests were performed. The assay was performed under different concentrations of turmeric and different milk dilutions as well as comparing with different quantities of the milk sample.

Standard Plate count

0.1ml from the serially diluted samples were transferred to petri plates .The nutrient agar plates were then overlaid with second layer media and the same was incubated for 24 hours under 37 °C .

Gram's staining

Standard Protocol of Gram's stain was applied on to the respective slides. (Bartholomev & Mittwer, 1952)

Biochemical Analysis

Various Biochemical analysis were performed for the assay of the bacterial load as per the standard protocols.

Results

A milk sample without the addition of turmeric was taken as control which makes a comparison of the color change occurred. Upon the addition of 0.1g on 50ml of milk sample there observed a 35% reduction in the color which can be assumed as the preservation property of turmeric on milk samples.

Table:-1 (MBRT on raw milk samples at 5 hours)

Sl no	Type of sample	Concentration of Turmeric	Quantity	Observations
1	Plane milk raw	nil	200ml	80% Color change
2	Plane milk	0.1g	200ml	40% color change
3	Plane milk	0.2g	200ml	40% color change
4	Plane milk raw	nil	150ml	80% color change
5	Plane milk	0.1g	150ml	40% color change
6	Plane milk	0.2g	150ml	40% color change
7	Plane milk raw	nil	100ml	80% color change
8	Plane milk	0.1g	100ml	40% color change
9	Plane milk	0.2g	100ml	40% color change
10	Plane milk raw	Nil	50ml	80% color change
11	Plane milk raw	0.1g	50ml	40% color change
12	Plane milk raw	0.2g	50ml	35% color change

Table:-2 (MBRT on Pasteurized milk samples under varying concentrations of turmeric at 50ml of sample taken at 5 hours)

Sl no	Type of milk	Turmeric concentrations	Quantity of sample	analysis
1	Plane Milk	nil	50ml	No change
2	Milk sample 1	0.1g	50ml	No change
3	Milk sample 2	0.2g	50ml	No change

The pasteurized milk samples as indicated in (Table 2) were analyzed under MBRT assay which makes a comparison with raw milk samples.

Pasterurised samples never showed any change with MBRT.

Table:-3 (MBRT on raw milk samples at 2 hours 30 minutes)

Sl no	Types of Sample	Concentration of Turmeric	Quantity	Observation
1	Plane milk (Raw)	Nil	50ml	60% color change
3	Plane milk sample	0.1g	50ml	10% color change
4	Plane milk sample	0.2g	50ml	Very slight color change
4	72° C heated and cooled milk sample	Nil	50ml	25% color change
5	72 °C heated and cooled milk sample	0.1g	50ml	No color change

The raw milk samples were assayed for 2 hours 30 minutes (Table: 3) .50 ml of sample was taken for the experiments. It was reported that raw milk sample upon MBRT showed 60% color change .The result revealed exiting when the sample was added with 0.1g of turmeric which showed only around 10% of color

change and presented with a very slight color change when it was added on with 0.2g.The raw milk was heated on to 72 ° and was cooled and MBRT was performed which showed a 25% color change and when the same was added with 0.1g turmeric, no change in color was obtained.

Table:-4 (Gram's Staining on various types of samples at 5 hours)

Sl no	Characteristic of culture plate used	Type of Bacteria
1	Plane Milk pasteurized	nil
2	Raw Milk	Gram +ve Bacillus
3	Raw milk heated and cooled	Gram +ve Bacillus
4	Effect of turmeric on milk	Gram +ve Bacillus

The various samples were subjected to Microbiological assays (Table 4) .The Raw Milk, and

the turmeric milk showed the presence of Gram + ve Bacillus followed by Gram Staining.

Table:-5 (Biochemical analysis on various samples)

Sl no	Type of sample	Indole	MR	VP	Catalase	Citrate
1	Plane milk	-ve	-ve	+ve	+ve	+ve
2	Milk heated and cooled	-ve	+ve	-ve	-ve	+ve
3	Raw milk with 0.1g Turmeric	-ve	+ve	-ve	-ve	+ve
4	Raw milk	-ve	+ve	-ve	-ve	+ve
5	Raw milk with 0.2g turmeric	-ve	+ve	-ve	-ve	+ve

The Biochemical test was performed after the Gram stain to reveal the presence of type of bacteria in the samples. Indole, Methyl Red, Voges Prausker, Catalase, and Citrate tests were performed .The results were depicted above (Table 5).All the type of samples

showed Citrate positive and all showed Indole negative. When the milk were treated with turmeric, it showed a –ve result for Indole test and +ve result for MR test which was followed by _ve result for VP and –ve for Catalase.

Table 6:-The criteria for the grading of milk as per standard protocol is considered. (IS: 1479 (Part-3)-1977)

Time	Quality of Milk
5 hours and above	Very Good
3 to 4 hours	Good
1 to 2 hours	Fair
Less than ½ hours	poor

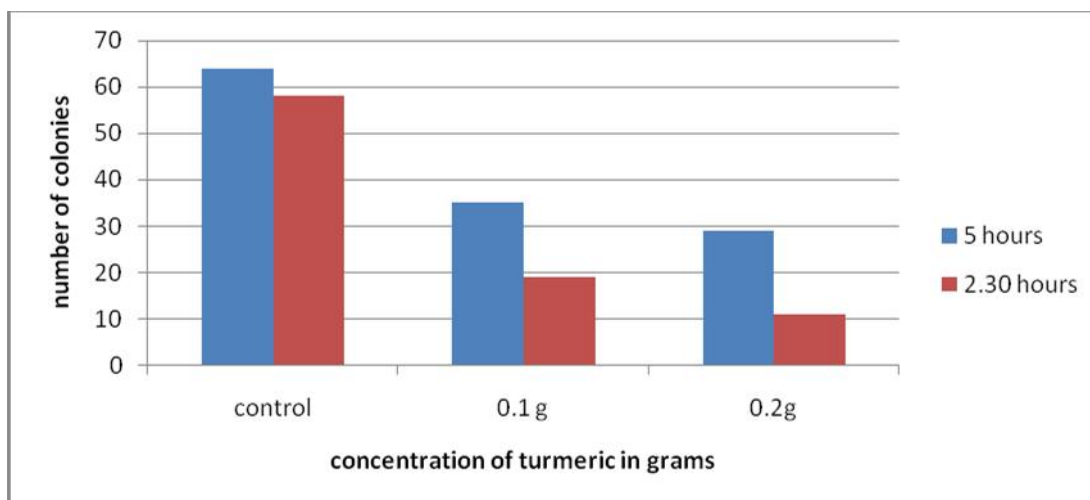


Fig:-1 (Standard Plate count of 50ml milk sample for bacteria under varying concentration of turmeric at 5 hours and 2.30 hours)

The standard Plate Count was performed for all the samples for bacteria under varying concentration of turmeric after 5 hours of incubation time. The standard Plate count showed 64 colonies on raw milk sample and 35 colonies only when it was treated with turmeric and which was considerably reduced to 29 when treated with 0.2g turmeric. The standard Plate count was compared on different time of incubation under 2 hours and 30 minutes of incubation time. The bacteria showed only 19 colonies on 0.1g and 11 colonies on 0.2g of turmeric milk which was incubated for 2 hours and 30 minutes.

Discussion and Conclusion

The Raw milk sample collected was assayed for its biochemical, microbiological and kinetic parameters. It is interpreted (Table 1) that there is no correlation between quantity of milk and its decay. 0.1g and 0.2 g of turmeric was added on to different quantities of raw milk samples and MBRT was performed. MBRT test result presented a 40% color change when the turmeric milk was kept for 5 hours (Table 1) and showed approximately 10% color change when the same was incubated under 2 hours 30 minutes (Table 3). Gram staining which was performed after 2 hours 30 minutes of sample presented the presence of a gram positive strain which may degrade the quality if kept in the room temperature for some more time (Table 4). Biochemical test predicted the presence of lactobacillus strain which showed to be active after 2 hours and 30 minutes of turmeric milk. The standard

plate count revealed remarkable results as it compared the turmeric milk of varying concentrations and raw milk (Fig 1). The turmeric milk sample presented only 19 colonies under 0.1g which confirmed the efficiency of turmeric as a good preservative to enhance the shelf life of raw milk sample without any refrigerated conditions.

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