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RESEARCH ARTICLE

Detection of Common Adulterants in Milk from Kanpur Uttar Pradesh

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Abstract

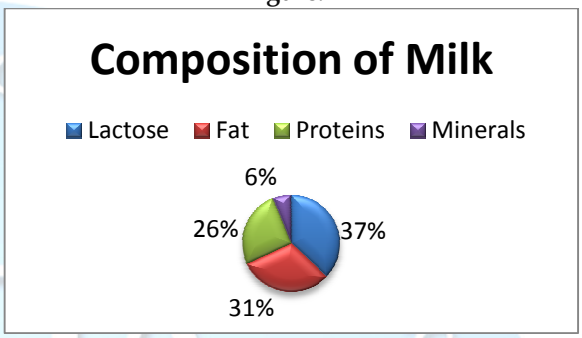
Milk is an essential artifact in daily life. It is not only a source of good quality protein, but also of calcium and riboflavin besides other nutrients. The present study was conducted to detect the presence of some common adulterants in milk procured from Kanpur Uttar Pradesh. Five milk samples, both open and branded were qualitatively analyzed for adulteration. These samples were tested for starch, glucose, sugar, vanaspati, boric acid etc. various preservative like formalin and some antibiotics are also added the milk for increase the shelf life of milk. This addition decreases the nutritive value of milk.

Keywords: Adulteration,milk, nutrients, starch, glucose, formalin etc.

INTRODUCTION

Milk is considered to be a complete food as it is a valuable source of good quality protein, carbohydrates (in the form of lactose), vitamins, minerals, importantly calcium and water Figure.1. Milk is adulterated with several chemicals like urea, starch, formalin, boric acid.[1, 2] The National Survey on Milk Adulteration 2011, a snap shot survey, was conducted to check the contaminants in milk, especially liquid milk, throughout the country. The study found that due to lack of hygiene and sanitation in milk handling and packaging, detergents (used during cleaning operations) are not washed properly and find their way into the milk. Other contaminants like urea, starch, glucose, formalin along with detergent are used as adulterants. These adulterants are used to increase the thickness and viscosity of the milk as well as to preserve it for a longer period. The study notes that the consumption of milk with detergents in hazardous to health. About eight per cent samples were found to have detergents.

Figure:1



Adulteration of milk reduces the quality of milk and can even make it hazardous. Most of the chemicals used as adulterants are poisonous and cause health hazards. Adulterants are mainly added to increase the shelf life of milk. Some of the preservatives like acid and formalin are added to the milk as adulterants, thereby increasing the storage period of milk. Generally, water is added to the milk to increase the volume content of the milk. [3, 4]

From the view point of protecting the health of the consumer, the Government of India promulgated the 'Prevention of Food Adulteration Act 1954' (PFA Act). The Act came into force from 1st June, 1955. It prohibits the manufacture, sale and distribution of not only adulterated foods but also foods contaminated with toxicants. Water is adulterants in milk which is always added to increase the volume of milk which inturn decrease the nutritive value of milk, if contaminated possess a health risk especially to infants and children.

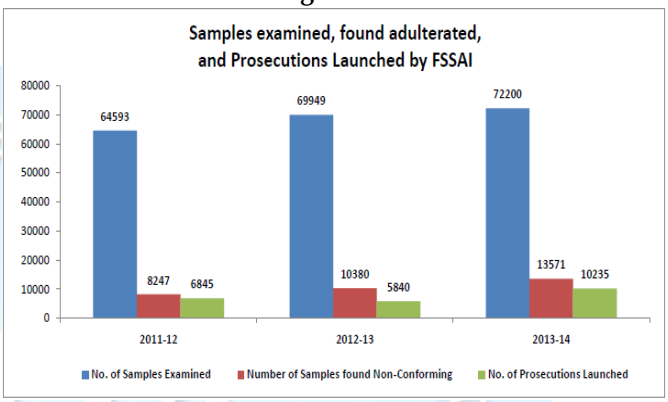
Thus it is obvious that apart from less harmful adulterants, toxic and potentially injurious substances also are being added to milk. Despite food legislation, adulteration remains uncontrolled, furthermore legal steps laid down in the PFA Act are extremely difficult to maintain due to inadequate and untrained man power and laboratory facilities.[5] Such is the state in the country where we are one of the largest nations of milk producers. In the year 2010-2011, India was ranked among the top 5 countries in the world producing 121.8 million tonne of milk.[6] Here are a few examples of what adulterants can be added to milk in order to maintain its freshness and market value which in turn is harmful to the consumer leaving them clueless of what direct effect these adulterants have on them.

Water is an adulterant in milk which is often always added to increase the volume of milk which in turn decreases the nutritive value of milk which if contaminated poses a health risk especially to infants and children.

Synthetic milk is produced by blending urea, cooking oil, detergent, caustic soda, sugar, salt and skimmed milk powder in order to make more profit. [6] Detergents are added to emulsify and dissolve the oil in water giving a frothy solution, the characteristic white color of milk. Detergents cause gastro – intestinal complications. Urea is added to milk to provide whiteness, increase the consistency of milk and for leveling the contents of solid-not-fat (SNF) as are present in natural milk. [3, 7, 8] Formalin and sodium-bicarbonate were detected as the common preservative. There was a positive relationship between ambient temperature and the use of formalin and sodium-bicarbonate. [9]

The presence of urea in milk overburdens the kidneys as they have to filter out more urea content from the body.Hydrogen Peroxide is also added to milk to prolong its freshness, but peroxides damages the gastro intestinal cells which can lead to gastritis and inflammation of the intestine. Starch is also used as an adulterant and if high amounts of starch are added to milk this can cause diarrhea due to the effects of undigested starch in colon. Its accumulation in the body may prove very fatal for diabetic patients. Carbonates and bicarbonates are added to milk too, this can cause disruption in hormone signaling that regulate development and Reproduction. [7, 10, 11-13]

Figure.2



The aim of this study is to analyze the fresh milk samples for composition and adulteration. So that to aware the people of that area about its nutrition and ill effects on their health.

Materials and Methods:

The present study was conduct in Department of Pharmacy, Pranveer Singh Institute of Technology, Kanpur, Uttar Pradesh. Five samples of milk were collected from the vendors in the city and were collected into clean dry sterilized plastic packages.

Table No. 1

S. No.	Food Article	Adulterants	Method for Detection
1.	Milk	Water	The lactometer reading was not ordinarily less than 26.
2.		Starch	Added few drops of tincture of iodine or iodine solution. Formation of blue color indicates the presence of starch.
3.		Glucose	Taking a teaspoon of milk in a test tube. Dip a strip of diastix in it or 30 sec. a change in color blue to green indicate the presence of glucose in milk.
4.		Urea	Taking a teaspoon of milk in a test tube. Added ½ teaspoon of soybean or Arhar powder. After 5 min, dip a red litmus paper in it. Remove paper after half minute. A change in color from red to blue indicates the presence of urea in milk.
5.		Synthetic milk	Synthetic milk has a bitter after taste, gives a soapy feeling on rubbing between the fingers and turns yellowish on heating**.**
6.		Vanaspati	Taking 3 ml of milk in a test tube. Added 10 drops of Hydrochloric acid. Mix one teaspoonful of sugar. After 5 minutes, examine the mixture. The red coloration indicates the presence of vanaspati in the milk.
7.		Formalin	Taking 10 ml of milk in a test tube and added 5 ml of Sulphuric acid from the sides of the wall without shaking. If a violet or blue ring appears at the intersection of two layers then it the show presence of formalin.
8.		Sugar	Taking 3 ml of milk in a test tube. Added 2 ml of resorcinol. The red coloration indicates the use of sugar in milk
9.		Sod. Bi carbonate	Taking 3 ml of milk in a test tube and added 5 ml of rectified spirit to it. Then added 4 drops of rosalic acid solution. The appearance of red/rosy coloration indicates the presence of sodium bi carbonate.

10.		Boric acid	Taking 3 ml of milk in a test tube. Added 20 drops of Hydrochloric acid and shake the test tube or mix up the contents thoroughly. Dip a yellow paper strip, and remove the same after 1 minute. A change in colour from yellow to red, followed by addition of one drop of ammonia solution, indicates that the boric acid (+)ve in milk.

Table No. 2

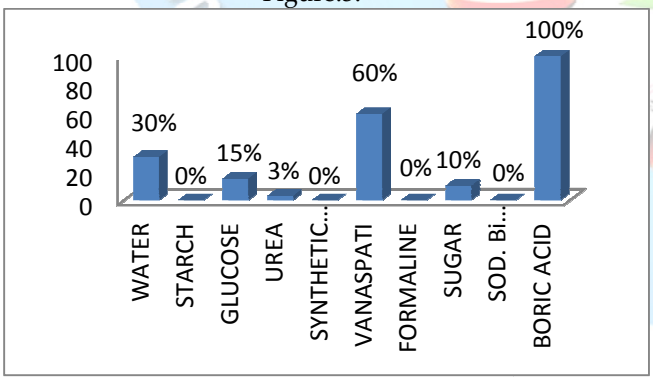
Test	Sample of Milk				
	A	**B**	**C**	**D**	**E**
Water	(+)ve	(-)ve	(-)ve	(-)ve	(-)ve
Starch	(-)ve	(-)ve	(-)ve	(-)ve	(-)ve
Glucose	(-)ve	(+)ve	(-)ve	(-)ve	(-)ve
Urea	(-)ve	(-)ve	(-)ve	(-)ve	(-)ve
Synthetic Milk	(-)ve	(-)ve	(-)ve	(-)ve	(-)ve
Vanaspati	(+)ve	(+)ve	(+)ve	(+)ve	(+)ve
Formalin	(-)ve	(-)ve	(+)ve	(-)ve	(-)ve
Sugar	(+)ve	(-)ve	(-)ve	(-)ve	(-)ve
Sodium bi Carbonate	(+)ve	(-)ve	(-)ve	(-)ve	(-)ve
Boric Acid	(+)ve	(+)ve	(+)ve	(+)ve	(+)ve

- (+)ve = Positive Result (-)ve = Negative Result

Result and Discussion:

Normal milk has a pH of 6.4 - 6.7. However, all the milk samples that were tested from Kanpur were slightly acidic in nature. Poor quality glucose has been reported in many studies. [13] However, similar to the study in Kanpur, glucose was absent in few sample of milk. Usually, sugars other than lactose are added to give diluted milk its characteristic sweetness and also increase the thickness of milk to adjust the lactometer reading. Starch is another common carbohydrate adulterant that was absent in milk Sample. Boric Acid was present in milk sample and some preservatives like Formalin and Sodium bi Carbonate was 96% absent in milk sample.

Figure.3.



Conclusion:

We conclude that the milk supplied in the Kanpur city is of good quality and appropriate for consumption. The quality of this milk was appropriate according to the standards prescribed by Food Quality Authority (FQA) of India. Milk and milk products play an important role in the nutrition of newborn kids, youngsters and adults. The presence of adulterants in the milk may cause adverse effects on the health of human beings. As most of the public are unaware of the ill effects of adulterants and preservatives on their health, awareness should be brought among the people about the milk adulteration to protect their health and to get good quality milk for which they are paying the amount.

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