

An Analytical Study of Milk Adulterants

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ABSTRACT

The study was carried out keeping in view the recently emerging Concern of adulteration of natural milk with various adulterants. This study explains in detail the harmful effects of various adulterants in brief. A total of 120 samples were collected in L.M.U. Parag. Qualitative analysis were carried out on 120 samples. Different test solutions and methods were used to detect the adulterants. Following are the significant observations of the study. Salt and urea were present 18.33% and 0.83%.

Key Words : Milk adulteration, Dairy, Qualitative analysis of milk adulteration, Health

INTRODUCTION

Milk is an almost ideal food. It has high nutritive value. It supplies bodybuilding proteins, bone forming Minerals and health giving vitamins and furnishes energy giving lactose and milk fat. Due to its nutritive value all these properties make milk and important food for pregnant mothers, growing children, young and old people. The composition of milk varies with the species, breed, diet, lactational period and interval between milking. There is individual variation also.

Constituent	Buffalo Milk %	Cow Milk%
Water	81.1	87.5
Fat	6.5	4.1
Protein	4.3	3.2
Lactose	5.0	4.4

Milk contains more than 100 substances that are either in solution, suspension or emulsion in water, the important being casein, the major protein of milk, lactose milk sugar, whey and mineral salts. Milk protein are complete protein of high quality *i.e.* it contains all the essential amino acids in fairly large quantities. The casein constitutes 80 per cent of the total nitrogen in milk, remaining whey protein constitutes lacto globulin and lacto albumin. The chief carbohydrate present in milk is lactose. The flavor of milk is due to milk fat. Milk is a true emulsion

of oil in water. Fat globules give milk most of its physical characteristics and give taste to dairy products such as butter, paneer, curd, cheese etc.

From the view point of protecting the health of the consumer the Government of India prevention of food adulteration at PFA act in 1954 the force from first June 1955 it prohibits the manufacture sale and distribution of not only adulterated foods but also food contaminated with toxins. The nature of adulterants generally encountered in milk product are addition of water, skimmed milk as milk, removal of fat, addition artificial sweeteners, thickening agent such as starch flour, urea, salt. Preservatives such as neutralizers which usually consist of sodium bicarbonate sodium hydroxide and calcium hydroxide. Some rarities includes animal fats, aflatoxins and vegetable oils.

The inclusion of harmful additives like urea and starch in milk is a concerning issue. Urea, added to enhance milk's consistency, can severely impact consumer health by overburdening the kidneys and inducing symptoms like vomiting, nausea, and gastric problems. Similarly, excessive starch in milk can lead to digestive complications such as diarrhea due to undigested starch in the colon. Additionally, the accumulation of starch poses serious risks, particularly for individuals with diabetes. It is essential for consumers to recognize these adulterants and their potential health risks. Furthermore, authorities

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should implement stringent measures to curb such practices and ensure the safety and purity of dairy products in the market. Carbonates and bicarbonate to milk too, this can call disruption in hormones signaling that regulate development and reproduction. Keeping in view the above facts the present study was conducted to detect various common adulterants in milk samples (De, Sukumar, 2006; Norman and Hotchkiss, 1996, Sathe, 1999, Srilaxmi, 2007).

METHODOLOGY

The test for adulteration were carried about on 120 milk samples obtained in L.M.U. Parag. Samples were collected in clean, dry test tubes by covering with lids. The milk samples were tested for the following adulterants-soda, urea, sugar, salt, starch and mineral oil. Different test solutions are used for the identification of the adulterants. The study was carried about one month. Duration of the study in one month we were taken total 120 samples for testing.

Procedure: 2ml. milk sample + 2ml. soda test solution mix and observe colour if red rose in colour then test is positive if pale orange colour then test is negative (Table 1).

Table 1 : Soda test	
Days (weekly 5 samples per day)	Result
1 st Week	2 samples were positive 28 samples were negative
2 nd week	4 samples were positive 26 samples were negative
3 rd week	4 sample were positive 26 samples were negative
4 th week	5 samples were positive 25 samples were negative

Procedure: 2 ml. milk sample + 2 ml. urea test solution mix and observe colour if pale yellow in colour then test is positive if light yellow colour then test is negative (Table 2).

Table 2 : Urea test	
Days weekly 5 samples per day	Results
1st week	No samples were positive 30 samples were negative
2nd week	No samples were positive 30 samples were negative
3rd week	1samples were positive 30 samples were negative
4th week	No sample were positive 30 samples were negative

Procedure: 1 ml. milk sample + 2 ml sugar test solution (1 ml. Conc. HCl + 1 ml. resorcinol) mix then heat to boil and cool observe colour a brick Red is in colour then test is positive, if light colour then test is negative (Table 3).

Table 3 : Sugar test	
Days weekly 5 samples per day	Results
1st week	2 samples were positive 28 samples were negative
2nd week	3 samples were positive 27 samples were negative
3rd week	5 samples were positive 25 samples were negative
4th week	3 samples were positive 27 samples were negative

Procedure: 5 ml. of test sample + few drops of potassium dichromate + 5 ml silver nitrate mix and observe colour if yellow in colour then test is positive, if brown then test is negative (Table 4).

Table 4 : Salt test	
Days weekly 5 samples per day	Results
1st Week	4 sample were positive 26 sample were negative
2nd Week	6 sample were positive 24 sample were negative
3rd week	4 sample were positive 26 sample were negative
4th Week	8 sample were positive 22 sample were negative

Procedure: 3 ml. of milk sample in test tube + 5 drops of iodine solution, mix it and observe colour if blue or violet in colour then test is positive, a brown or yellow colour then test is negative (Table 5).

Table 5 : Starch test	
Days weekly 5 sample per day	Results
1 st	3 sample were positive 27 sample were negative
2 nd	7 sample were positive 23 sample were negative
3 rd	4 sample were positive 26 samples were negative
4 th	6 samples were positive 24 samples were negative

Procedure: 50 ml of milk sample test tube centrifuge for 15 minutes removed layer, convert into ghee. Take 1 ml. ghee in a flask and 22 ml alcoholic

KOH slowly into it, heat it + 25 ml distill water mix it and observe colour. If turbidity is there then test is positive if transparent then test is negative (Table 6).

Days weekly 5 samples per day	Results
1 st	2 Samples were positive 28 Samples were negative
2 nd	4 Samples were positive 26 Samples were negative
3 rd	1 Samples were positive 29 Samples were negative
4 th	4 Samples were positive 26 Samples were negative

RESULTS AND DISCUSSION

A total of 120 milk samples were tested. All tests were carried out at room temperature. The results were summarized into Table 7 according to the tests.

Sr. No.	Adulterants	No. of positive samples	No. of negative samples	No. of total samples
1.	Soda	15 (12.5%)	105 (87.5%)	120
2.	Urea	1 (0.83%)	119 (99.16%)	120
3.	Sugar	13 (10.83%)	107 (89.16%)	120
4.	Salt	22 (18.33%)	98 (81.66%)	120
5.	Starch	20 (16.66%)	100 (83.33%)	120
6.	Mineral oil	11 (9.16%)	109 (90.83%)	120
7.	Total	82 (11.38%)	638 (88.61%)	720

As evidence all the samples tested positive results were 82(11.38%) and the number of negative samples were 638 (88.61%). The maximum and minimum amount of adulterants were salt and urea found positively in the study.

Conclusion:

It is Apparent from analysis that a number of samples did not confirm to the legal standard prescribed by the food safety and Standards Authority of India. These result suggest that most of the samples were found not adulterated by different adulterants. The extent of adulteration varied significantly. The milk samples testing done before processing and adulterated milk rejected to further processing. In a country such as India where milk and Milk products play an important role in different food stuffs. This analysis should bring about more awareness to public about different milk adulterants.

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