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Analysis Of Milk Quality, Adulteration And Mastitis In Milk Samples Collected From Different Regions Of Dehradun

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Abstract: The present study is aimed to analyze the milk quality, adulteration and mastitis infection in milk sold at different regions of Dehradun. Hundred random raw milk samples were collected from dairy owners from 30 different regions of Dehradun. A total number of 100 samples were analyzed for physical appearance, quality, adulterants and mastitis infection. Ninety % milk samples were white in color and 10 % were yellowish white. pH ranged between 6.7 – 6.9. Analysis of milk quality showed that 15 milk samples were of very poor quality, 73 samples were of fair quality, 10 were good and only 02 samples were of very good quality. Out of 100 milk samples analyzed for adulteration, adulterants found were glucose (80%), skim milk powder (58%), salt (51%) and urea (35%) while found negative for formalin, salicylic acid, boric acid, starch, soap and ammonium sulphate. All the samples were free from mastitis infection. The adulterants decrease the nutritive value of milk and may also cause serious human health related problems.
Keywords: raw milk samples, milk quality, adulteration, mastitis.

Introduction[1-6]

It is not exactly known when man started utilizing milk of other animals for his benefit, but the importance of milk in our diet has been recognized since Vedic times. The National Dairy Development Board (NDDB) has revealed in an annual report for 2010-11 that India continues to be the largest milk producer. The estimated milk production for 2010-11 is 121 million tonnes. Country has almost reached 17 % of world milk production. Milk has been recognized as an almost complete food for man as it is a source of essential nutrients like carbohydrate, protein, fat, vitamins and minerals. Milk is required for promoting growth and maintenance of health. It can however also serve as a vehicle for the transmission of chemicals and other impurities.

A national survey in India has revealed that almost 70% of the milk sold and consumed in India is adulterated by contaminants such as detergent and skim milk powder, but impure water is the highest contaminant. According to National Survey on Milk Adulteration conducted by FSSAI (India) in 2011, water is the most common adulterant followed by detergent in milk. A survey by FSSAI in 2012, 68% milk samples was found to be adulterated in which 31 % were from rural areas. Of these 16.7 % were packet or branded milk and rest were loose milk samples from dairies. In the urban areas, 68.9 % milk was found to be adulterated with water, detergent, urea and skim milk powder. In Uttarakhand, 88% milk was found to be adulterated. Despite the laws governing the quality and sale of milk existing in India for decades, the adulteration of milk has not been checked completely.

Materials and Methods[1-6]

Collection of the samples:

Hundred raw milk samples were collected from dairy owners from 30 different regions of Dehradun. The samples were collected from nearby areas in the morning to be transported easily without any delay. The samples were collected in 50ml screw capped sterilized bottles (Borosil). All the possible precautions were taken to avoid external contamination at the time of collection of samples and during processing.

Analysis of milk samples:

The raw milk samples were analyzed for physical appearance, quality, presence of adulterants and Mastitis infection. Color and pH of all samples were checked and milk quality was analysed by Methylene Blue Reduction test (MBRT), Alcohol test, Phosphatase test and Clot on boiling (COB) test. The adulteration tests were done using the HiMedia Adulteration Testing Kit protocol. Tests included were Urea test, Salt test, Soap test, Skim milk powder test, Glucose test, Formalin test, Salicylic Acid test, Boric Acid test, Starch test and Ammonium Sulphate test (Table 4). The mastitis tests were White Side test, Chloride test, Catalase test, Strip Cup test.

Results:

The color of milk observed was white in appearance (90%) to yellow (10%). The pH of milk samples ranged from 6.7 to 6.9 (Table 1). Fifteen milk samples were of very poor quality, 73 samples were of fair quality, 10 were good and rest only 02 samples were of very good quality. (Table 2, Fig. 1 & 2). Eighty milk samples were containing phosphotase enzyme, 60 samples were showing acidity, salt unbalance and high albumin and 28 were positive in COB test (Table 3). The adulterants analysed were glucose (80%), skim milk powder (58%), salt (51%) and urea (35%) while found negative for formalin, salicylic acid, boric acid, starch, soap and ammonium sulphate (Table 4, Fig. 3). All the samples showed negative result for mastitis infection.

Table 1. Physical properties of milk

Location number	Location (Dehradun)	Color	pH
1	Subash nagar	White	6.5
2	Clement town	White	6.4
3	Shimla bypass	White	6.8
4	Turner road	White	6.8
5	Mobewala	Yellowish white	6.8
6	Defence colony	Yellowish white	6.8
7	Ajabpur kala	Yellowish white	6.8
8	Mahakalie enclave	White	6.8
9	G.M.S road	White	6.7
10	Engineer enclave	White	6.8
11	Patel nagar	White	6.4
12	Mazra	White	6.0
13	Kawali road	White	6.4
14	Balliwala	White	6.8
15	Saharanpur chock	Yellowish white	7.0
16	Moti bazaar	Yellowish white	6.8
17	Neranjanpur	White	6.8
18	Khurbura	White	6.4
19	Kargi chowk	Yellowish white	6.9
20	Saraswati vihar	White	6.9
21	Dharampur	White	6.9
22	Banjarawala	White	6.9
23	Nehru colony	Light yellow	6.9

24	Bindal	White	7.0
25	Fish market	White	7.0
26	Yamuna colony	White	7.0
27	Krishna nagar chowk	White	6.9
28	Rajpur	Light yellow	7.0
29	Clock tower	White	6.9
30	Subash nagar	White	6.5

Table 2. Analysis of milk quality (MBRT)

QUALITY/GRADE	NO. OF SAMPLES
1/2HOUR(VERY POOR)	15
1HOUR(FAIR)	30
1.1/2HOUR(FAIR)	35
2HOUR(FAIR)	08
3HOUR(GOOD)	05
4HOUR(GOOD)	05
6HOUR(VERY GOOD)	02

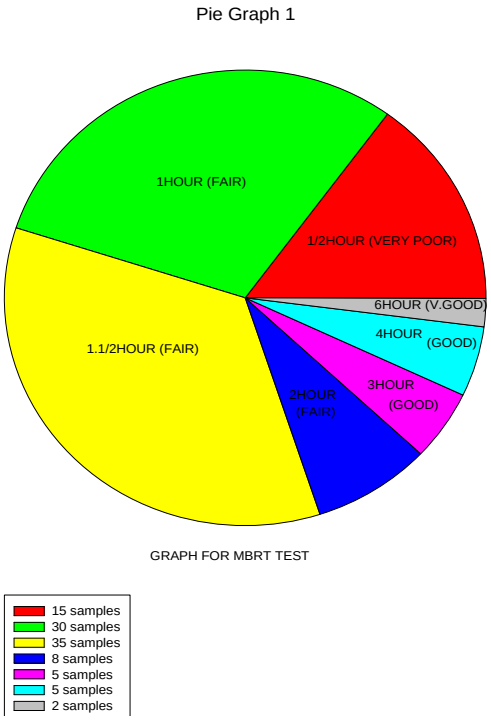

Fig. 1. Analysis of milk quality (MBRT)

Fig. 2. Analysis of milk quality

Table 3. Analysis of milk quality

TEST	DETECTION	+VE SAMPLE
ALCOHOL TEST	ACIDITY, SALT UNBALANCE, HIGH ALBUMIN	69
PHOSPHOTASE TEST	PHOSPHATASE ENZYME	80
CLOT ON BOILING TEST	QUALITY	28

Table 4. Detection of adulterants in milk samples

S. NO.	ADULTERANT	TEST	+VE SAMPLE
1	UREA	UREA TEST	35
2	STARCH	STARCH TEST	0
3	SOAP	SOAP TEST	0
4	SALT	S ALT TEST	51
5	FORMALIN	FORMALIN TEST	0
6	SALICYLIC ACID	SALICYLIC ACID TEST	0
7	BORIC ACID	BORIC ACID TEST	0
8	SKIM MILK POWDER	SKIM MILK POWDER TEST	58
9	AMMONIUM SULPHATE	AMMONIUM SULPHATE TEST	0
10	GLUCOSE	GLUCOSE TEST	80

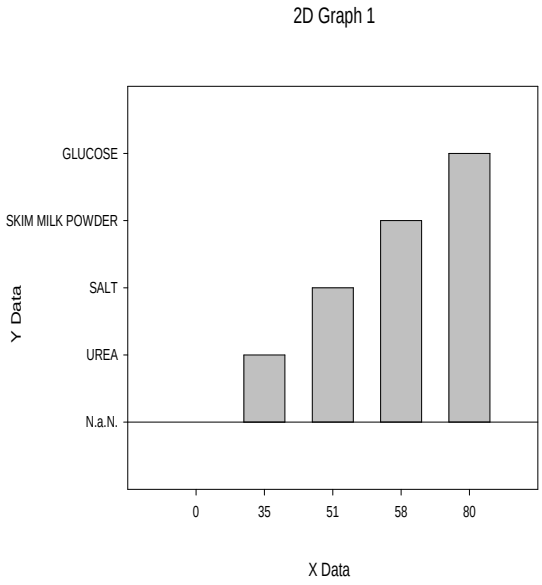

Fig. 3. Detection of adulterants
(X- data: percent positive samples; Y- data: Adulterants)

Discussion

Milk is one of the most complete foods available in nature for human consumption. Milk contains all nutrients in balanced proportions to meet the demand of humans. Good quality milk is required for quality dairy products. The adulterated raw milk with adulterants is taken as defective and cannot be processed. Recently Chakravorty and Chakravarty (1) showed that milk distributed in different localities of Varanasi city is highly adulterated and impure.

In the present study, out of 100 samples, only a few meet the standards to be recognized as good quality of milk. The milk samples have white or yellow color with pH ranges from 6.7-6.9. These findings agreed with the reports of Judkins and Mack (2), who reported that normal milk has a yellowish color due to presence of fat, casein. These differences in color may be due to differences in nature of feed consumption or the breed of cow or the fat and solid contents of the milk (3). As per the present data, only 02 milk samples were under very good quality standards while 15 samples were of very poor quality category. Milk, as it is secreted from the udder of a healthy cow is very low in bacterial numbers. Bacteria can increase in raw milk due to poor milking methods, inadequate cleaning of milk equipment, poor cooling and in some cases, as a result of mastitis (4).

Out of 100 milk samples tested for presence of adulterants, Glucose was highest

(80 %), skim milk powder (58%) followed by salt and urea with 51% and 35% respectively. Wadekar *et al.* (5) observed the variation in adulteration in different season at latur. They observed that maximum milk samples adulterated with sugar were 20.00 per cent in summer, 12.00 per cent in rainy and 3.00 per cent in winter seasons. Recently Kandpal *et al* (6) also showed poor milk quality of milk at Jolly Grant, Dehradun area and showed the presence of urea and detergents as adulterants in milk samples.

Mastitis, an infection of the udder, is one of the most common heard concerns. Mastitis in dairy cows, which is most often result of a bacterial infection (contagious or environmental), causes an increased somatic cell levels in milk. Unhealthy cow's milk has the potential to yield milk that is lower in quality. However, in the present study no positive samples were found for mastitis.

Conclusion

On the basis of data obtained in the present study, conclusion may be drawn that milk quality is not completely as per standards and adulteration in milk is still in practice and has not been checked completely. It is increasing very fast in Dehradun. Consumption of lower quality milk may lead to serious human health problems. To eradicate this malpractice by local dairy owners which is deep rooted in the cities more than rural areas, steps should be taken from the door steps of local consumers. The consumers must be more active against milk adulteration going on in whole country. It is important to have a quality control system that regularly check and ensure that only good quality milk is sold. The consumers and the milk sellers combined effort will help to decrease the adulteration practice.

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