

# SHORT COMMUNICATION

# A Study on Detection of Adulteration in Milk Samples from two Districts of Chhattisgarh State

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#### ABSTRACT

Milk has high value as a food because it supplies good quality proteins, fat, carbohydrates, vitamins and minerals in significant amount than any other single food. Milk is a perishable commodity; due to this some vendors and middle man add preservative to milk to increase its self-life, water to increase volume and thickening agent to counter the dilution. The 65 milk samples collected from vendors and local household of Durg- Bhilai and Rajnandgaon were examined for the presence of different adulterants and preservative. The most commonly found adulterant in tested milk samples were detergent (32%) followed by pond water (26%), skim milk powder (15%), neutralizer (12%), glucose (12%), shampoo (9%), sodium chloride (7%), sucrose (6%) and urea (3%). The adulterant in milk not only causes economic loss but also health hazards to consumers. Hence there is urgent need for creating awareness among consumers and local milk vendors about unethical malpractices in milk supplying chain.

Keywords: Adulteration, Milk, Quality control

Milk is an important source of nutrition to human particularly to children and infants. It is also a necessary source of macro and micro nutrients for the growth, development and maintenance of human health. Milk is one of the most adulterated food commodities (Kandapal *et al.*, 2012; Kajal *et al.*, 2012) and adulteration is based on the economics of demand and supply. The urbanization and high population growth in India increases the demand of milk which influences the possibility of adulteration to meet out this demand (Swetha *et al.*, 2014; Singh *et al.*, 2015). In urban area of Chhattisgarh milk is transported from point of production to consumers by middle man. Middle men are commonly adulterating the milk to increase their profit. Adulteration of milk may be toxic to consumers and could affect the health and deprive essential nutrients required for proper growth and development of a human (Afzal *et al.*, 2011; Hossain and Dev, 2013; Singuluri and Sukumaran, 2014). The milk is commonly adulterated by addition of water and thickening agent *viz*. urea, starch, flour, cane sugar, vegetable oils, detergents etc. Various preservatives (formalin, boric acid), neutralizer (sodium carbonate, sodium bicarbonate) and some antibiotics are also added to milk to increase its shelf life. In view of this; the present study was aimed to assess the status of common adulterants in milk in two districts of Chhattisgarh state.

A total of 65 unprocessed milk samples were collected from vendors and household of Durg- Bhilai and Rajnandgaon districts of Chhattisgarh state during December 2017 to September 2018. Milk samples were collected in a clean sample collection container and transported to laboratory



in thermo-cooled container with in 2 hrs and were stored at 4°C till analysis.

The samples were tested for pH and other quantitative tests. A standard milk adulteration kit from HIMEDIA laboratories, Mumbai, India was used for the analysis of samples. The milk samples were tested for the formalin, urea, sucrose, starch, water, neutralizers (NaHCO<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub>), detergents, shampoo, sodium chloride, skim milk powder, sucrose, glucose/dextrose, hydrogen peroxide and acidity and heat stability of milk.

The Milk samples collected from different vendors and local households of Durg- Bhilai and Rajnandgaon were examined for presence of different adulterants and preservatives. The most commonly found adulterants in tested milk samples were detergent (32%) followed by pond water (26%), skim milk powder (15%), neutralizer (12%), glucose (12%), shampoo (9%), sodium chloride (7%), sucrose (6%) and urea (3%). Out of Total 65 tested samples, 25% samples were found positive for two and more than two adulterants. One sample out of all tested samples was found positive for both urea and detergent thus may have possibility of synthetic milk supply to consumers. The 3% samples were acidic. The 46% of total tested samples were alkaline in nature and have deviation from normal pH of 6.7. The 50% the milk samples collected from Hyderabad city were also found alkaline in nature (Singuluri and Sukumaran, 2014). Alkalinity of milk is commonly results from adulteration of milk with neutralizers/stabilizers. Neutralizers are added to the milk for preventing curdling and thereby, increase the shelf life of milk. During present study 12 % of the tested milk samples were adulterated with neutralizers. In many regions of India, milk has been reported to be adulterated by traders with caustic soda, sodium carbonate and sodium bicarbonate to neutralize the acidity of milk (Afzal et al., 2011; Barham et al., 2014; Singuluri and Sukumaran, 2014). The acidic nature of milk indicated that the milk may be mastitic milk or colostral milk as it contains high percentage of protein. Such milk is not good for human health.

For the emulsification and getting characteristic white colour in milk detergent is used as an adulterant. (Kandapl *et al.*, 2012). During present study 32% of tested samples were found adulterated with detergent. The higher percentage (between 44-100) of milk samples were tested

positive for detergent by various researchers (Kumar *et al.*, 2015; Pouranik *et al.*, 2017; Nayak, 2018; Gupta and Patiyal, 2014). Detergents are commonly used for cleaning of milk containers and their residue in container may be one of the possible source in the milk. In present study, 9% of samples were found positive for the presence of shampoo. Moreover, all the samples found positive for shampoo were also found positive for pond water. Thus it may be possible that shampoo residue in milk is through addition of pond water.

Table 1: Various adulterants detected in milk samples

Sl. No.	Name of adulterant	No. of positive samples
1	Formalin	0
2	Urea	2
3	Starch	0
4	Detergent	21
5	Neutralizer	8
6	Sodium Chloride	5
7	Sucrose	4
8	Skim Milk	10
9	Glucose	8
10	Hydrogen peroxide	0
11	Cellulose	0
12	Maltose	0
13	Ammonium sulphate	0
14	Boric acid	0
15	Pond water	17
16	Shampoo	6

The skim milk Powder and glucose are added in milk as a thickening agent. In present study, 15% of milk samples were found adulterated with skim milk powder which is in agreement to the findings of Pouranik *et al.* (2017) who reported 14.81% samples were adulterated with skim milk powder whereas higher percentage (82%) of skim milk powder adulteration was reported by Kumar *et al.* (2015). The 12% of tested milk samples were found adulterated with glucose which is similar to the findings of 11.11% adulteration reported by Pouranik *et al.* (2017).

Addition of sodium chloride in milk is practiced with the aim of increasing the density of milk as well as the ash content in water adulterated milk. 7% of tested milk samples were found positive for sodium chloride. Higher percentage of 59.25%, 28.26%, 80%, 82%, 24% of milk samples adulterated with sodium chloride were reported by Pouranik *et al.* (2017), Swetha *et al.* (2014), Kumar *et al.* (2015), Singuluri and Sukumaran (2014), Gupta and Patiyal (2014) respectively.

In present study only 3% of tested samples were found positive for adulteration of urea. Urea adulteration in 22% samples of milk was also reported by Pouranik *et al.* (2017), Similarly higher percentage of 60% and 51.2% were also reported by others (Kumar *et al.* 2015; Gupta and Patiyal, 2014; Singuluri and Sukumaran 2014).

## CONCLUSION

Milk is considered to be a complete food as it is a valuable source of good quality protein carbohydrate vitamins, minerals. Adulteration in milk has threatening consequences on human health. The result of present study showed that milk samples from different places of Durg- Bhilai and Rajnandgaon districts of Chhattisgarh contain various adulterants like detergents, shampoo, urea, sucrose, water, neutralizers (NaHCO<sub>2</sub>, Na<sub>2</sub>CO<sub>2</sub>), sodium chloride, skim milk powder. The consumers must be aware about the various adulterants and malpractices in milk. The person involved in milk collection, processing, packaging and distribution in the study area should also be educated about health hazard of adulterants. The findings of present study gave a clue to local authority for urgent need to implement hygienic practices, regular monitoring and quality control to ensure availability of good quality milk the to consumers.

### REFERENCES

- Afzal, A., Mahmood, M.S., Hussain, I. and Akhtar, M. 2011. Adulteration and microbiological quality of milk (a review). *Pak. J. Nutr.*, **10**(12): 1195-1202.
- Barham, G.S., Khaskheli, M., Soomro, A. H. and Nizamani, Z. A. 2014. Extent of extraneous water and detection of various adulterants in market milk at Mirpurkhas, Pakistan. *IOSR J. Agri. Vet. Sci.*, 7: 83-89.

- Gupta, N. and Patiyal, A. 2014. Assessment of the Quality of Milk. J. Vet. Pub. Health, 12(1): 45-48.
- Hossain, M.B. and Dev, S.R. 2013. Physiochemical characteristics of various raw milk samples in a selected dairy plant of Bangladesh. *Int. J. Eng. Appl. Sci.*, 1(3): 2305-8269.
- Kajal, M.F.I., Wadud, A., Islam, M.N. and Sarma, P.K. 2012. Evaluation of some chemical parameters of powder milk available in Mymensingh town. *Journal of Bangladesh Agriculture. University*, **10**(1): 95-100.
- Kandpal, S.D., Srivastava, A.K. and Negi, K.S. 2012. Estimation of quality of raw milk (open and branded) by milk adulteration testing kit. *Indian J. Comm. Health*, 24(3): 188-192.
- Kumar, A., Goyal, S.K., Pradhan, R.C. and Goyal, R.K. 2015. A Study on status of milk adulterants using in milk of district Varanasi. *South Asian J. Food Technol. Environ.*, 1(2): 140-143.
- Nayak, N. 2018. Detection of Different Adulterant in Different Milk Samples. *Research and Reviews: J. Dairy Sci. Tech.*, 6(3):17-29.
- Pouranik, M., Siddiqua, A. Sarkhel, S. and Tripathi, M. 2017. Adulteration in Local Available Milk Samples of Jabalpur Regions–A Comparative Study. *Journal of Asian resonance*, 6(3) 1-7.
- Singh, J., Roy, B., Dayal, G., Sunsunwal, S., Yadav, B., Bhardwaj, C., Teotia, A. 2015. Detection of common adulterants in milk from Delhi and NCR. *DU Journal of Undergraduate Research and Innovation*, 1(1): 152-156.
- Singuluri, H. and Sukumaran, M.K. 2014. Milk adulteration in Hyderabad, India-a comparative study on the levels of different adulterants present in milk. J. Chromatograph. Separat. Techniq., 5(1): 1-3.
- Sudershan, R.V., Pratima, R. and Kalpagam, P. 2009. Food safety research in India: a review. *As. J. Food ag-ind.*, **2**(3): 412-433.
- Swetha, C.S., Sukumar, B., Sudhanthirakodi, S. 2014. The Study on Detection of Adulteration in Milk Samples Supplied by Local Vendors in Tirupathi Region, India. *Shanlax International Journal of Veterinary Science*, 2(2): 1-11.