



Detection of Adulterants in Milk from Different Areas of Patna

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Milk, used as a basic food in India especially by children, old people and pregnant woman is being subjected to malicious practices such as adulterated by some milk vendors and khattal milkmen. Milk adulterated with toxic additives such as urea, formalin, water, salt sugar etc. should be properly checked. For this samples of khattal milk was collected from different areas of Patna namely Boring Road, Patliputra and Digha and adulterants were detected at Sudha Dairy Industry's laboratory. One sample of Sudha dairy was also taken to compare to quality difference. No adulterants were detected in Sudha Dairy Milk but of sample from Boring Road showed the presence of water, formalin & neutralizers, from Patliputra the common adulterants were formalin, neutralizers, sugar and water and Digha sample showed the presence of neutralizer, starch, urea and water. Thus, it was deduced that water due to its cheap availability dominated as an adulterant in a forementioned areas.

The adulterants pose great health hazards like they damage liver, heart & kidney, may also lead to heart attack. It's peak time to generate awareness and strict actions should be taken by the Indian Government so that neither the Khattal owners nor the Pilot Scale Dairy Industries should perform such malicious practices.

Some remedies suggested here to preserve milk is to store it at $4\pm 2^{\circ}\text{C}$ i.e. to prefer chilled and pasteurized conditions to preserve milk. Also, sensing systems for frequently used milk adulterants like whey protein and detergents should be developed to test the quality of milk.

Key words :- Milk, Adulterants, Khattal Milk, Quality.

Introduction :Milk is India's largest agricultural commodity in terms of its output value surpassing even major cereals like rice & wheat. It is an essential nutritional food for infants and adults alike. Milk is a complete food as its protein contains all the ten essential amino acids, vitamins A, D, E and K. Carbohydrates like lactose, minerals like potassium (K), Calcium (Ca), magnesium (Mg), Zinc (Zn) etc. Among these the bio-availability of calcium in milk is high & its uptake is important throughout life so, milk continues to be the most important source particularly in most unfavourable physiological condition such as achlorhydra. (Peter C Ewood, 2005) Both animal and human studies have suggested a deduction in colon cancer by calcium supplement & by milk (Cho E at al, 2004). Water is the main constituent of milk. Milk processing is designed to remove water from milk to reduce the moisture content.

But milk is also a potential carrier of microbes, chemicals or adulterants from production to transportation & poses hazards to public health that is

unsafe. Due to this there are evidence that milk consumption has fallen over the past 20-25 years in many countries. This is mainly due to adulteration of milk which alters the milk characteristics Mixing something impure with something genuine or an inferior article with a superior one of the same kind (West Encyclopedia American Law, 2005) is known as adulteration.

Milk is adulterated mainly with the toxic additives like Urea, Formalin, Caustic soda etc. to increase the consistency and it is also said that such adulterated milk remains intact even for two days or more while ordinary milk goes sour within a day (V Degulmath, 2002) The huge profit margins by sales of adulterated milk has made this happen. Substances such as sodium bicarbonate (to increase the shelf life of milk), starch (to increase its viscosity), sweetening agents (to improve its taste) & Urea to lend it uniformity) are added to make it preservable and acceptable. These are the substances that are mixed to milk so that the quantity of

that milk may rise up without paying cost for that raised quantity which leads to a high profit. Stringent actions by Food and Drug administration (FDA) officials have brought many adulterants to book but it is not enough (M.S.Kamnath, 2008). Milk adulterated with chemicals was firstly detected in Kurukshetra, in November, 1994. Now, the menace of milk adulteration has spread to Rajasthan, Uttar Pradesh, Himachal Pradesh & to milk deficit areas of Madhya Pradesh, Orissa and even Bihar (Arindam Mukherjee, 1006). Some milk vendors have mastered the trick of milk adulteration from various Khattal milk & private milk dairies. Some of the reasons of adulteration are perishable nature of milk, demand and supply gap, unorganized procurement supply and lack of quality system.

Method & Methodology :

Area of study

The cow's milk sample was collected from different areas of Patna Viz Boring Road, Patlitpura & Digha & one milk sample was taken from Sudha Dairy.

Tools & Techniques:-

Glassware's:- Test tube, flasks, pipettes & Lactometer

Chemical used :- Alcohol, Rosalie acid, conc. sulphuric acid, Resorcinol hydrochloric acid, 1% Iodine, Para dimethyl amino benzaldehyde (16%), silver nitrate (0.8%) & 1% potassium dichromate.

Sample Size & Sampling Method:-

The liquid milk samples were randomly collected from the khatal and 250ml of each sample was taken and different test was performed for each of the adulterant present

Method of Data Analysis:-

The milk samples were subjected to organic leptic test to detect the odour, colour & taste of the sample

The standard observation for the presence of each of the adulterant was taken.

Result :

On the basis of the standard, result for the milk sample of three different areas was taken.

Area	Sample	Adulterants Detected
Boring Road	A	Neutralizer, Starch, Water
	B	Starch, Water

Patliputra	C	neutralizer, Formalin, Sugar, Water
	D	Formalin, Water
	A	Neutralizer, Formalin, Sugar, Water
	B	Neutralizer, Water
Digha	C	Salt, Starch, Water
	D	Formalin, Sugar, Water
	A	Neutralizer, Salt, Water
	B	Formalin, Sugar, Starch, Water
Sudha Dairy	C	Neutralizer, Starch, Urea, Water
	D	Neutralizer, Sugar, Water
	S	No detection

Discussion :

Various adulterants detected poses different health hazards as motioned below:-

- (a) Urea – It is mainly added in the preparation of synthetic milk. It is harmful to heart, liver and Kidney.
- (b) Starch and Sugar – It's addition increases the SNF Value. Their addition in milk may lead to diabetic attack and obesity
- (c) Neutralizer – Neutralizers such as, caustic Soda which contains sodium acts as a slow poison for those suffering from hypertension and heart ailments
- (d) Formalin – It is primarily used for preservation in view of its wide-spread use, toxicity and volatility. Formalin is a significant consideration.

Conclusion :

It can be concluded that the adulteration of milk is practised in large extent over different areas of Patna. India leads the world in total milk production, however, the tropical climate, unorganized milk production, laxity in quality control, a lo-psided demand and supply position coupled with evolution of recalcitrant pathogens in the dairy industry are the major factors causing the development pace to bog down significantly. The situation is further being deteriorated by reports of synthetic milk being prepared comprising of chemicals like urea, neutralizer, detergents which can get metabolized into carcinogenic and endocrine

disrupting agents thus jeopardizing the health of people. Thus, detection of adulterants in milk and other products and by products is one need of the hour which will not only address the national need and export potential of Indian Food Processing Industry but will lead to developing of sensing technologies and, therapeutics at Competitive International level. The comprehensive approach will add value by controlling the adulterated milk.

Thus it would not make sense for the basic food being adulterated and our healthy life being subjected to deterioration just for the profitability of these milkmen. Now, it is a peak time to generate an awareness and concern among people of all class before the adulterants engulf the future of the budding infants and future generations.

Suggestion :

(a) Development of sensing systems for frequently used milk adulterants like whey protein and detergents. In this, incorporation of sensing system occurs with the suitable sensing system so that the whole bio-sensor can be developed into quality detection kit or unorganized dairy sector level. It can also be done at industrial level.

(b) Adulteration of any kind is banned and therefore other organization associated with Dairy Industry should be given strict directions to stop such malpractices.

(c) People should be made aware of the dangers of such milk adulterations with the help of add campaigns, media, journals, etc.

(d) Pregnant women and babies should be prevented from drinking Khatthal's cow milk. Instead Packaged and Pasteurized milk available in the market should be prioritized.

(e) Rather using adulterants or preservatives milk should be kept at low temperature which prevents microbes from multiplying and rendering off tastes to its as the enzymatic activity of microbes slows down and thus milk is prevented from being curdled. Milk should always be preserved at +4°C.

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