



Review

Milk Adulteration – A Systematic Review

Mahzbeen Ansari and Mohd. Shamsul Haque *

Department of Chemistry, Govt. Indira Gandhi Home Science Girls' P. G. College, Shahdol, Madhya Pradesh, India

Department of Zoology, Govt. Indira Gandhi Home Science Girls' P. G. College, Shahdol Madhya Pradesh, India

*Corresponding author email: mshaque21@gmail.com

Received: 30/07/2023

Revised: 06/08/2023

Accepted: 10/08/2023

Abstract: Milk Adulteration is the process by which intentionally degrading milk quality either by adding some inferior substances or by removing some valuable ingredients. It is done to increase the quality of milk. In this systematic review different adulteration which decrease their nutritive value added to the milk have been discussed. Now a days Milk which is a vital source of nutrients is being adulterated by many toxic agents leads to various health issues.

Keywords: Adulterants, Nutritive value, Toxic agents.

Introduction:

Milk is a complete diet which is full of nutrients and is produced by the mammals (Swar et al, 2021). Milk is required for growth in infants, youngsters and adults. Amino acids present in the proteins are required for growth in infants and children. It is also necessary for the maintenance of tissues in adults. Milk and Milk products are consumed by almost six billion people worldwide (Moore et al, 2013). Its use has a great importance because of the nutrients energy. Milk could be a perfect food as it

is a readily digested and absorbed. It is the sole natural food for infants and youngsters (Azad and Ahmed, 2016). In short, milk is a complete package for health maintenance, if consumed properly. It is the basic diet for the newborn child because their digestive system is not developed in the early stage of life and milk is the only diet that they can be digested. In china “big head disease” scandal was reported in 2004. Infants were fed on unhealthy formula of milk that caused rapid weight loss from their bodies and head swelling thus called a “big head disease” (Xin and Stone, 2008).

The milk constituents many particles containing lactose, water, fat, proteins, milk, sugar and salt minerals. Trace amount of various phospholipids, vitamins, Enzymes are there in the milk. The quality of milk is being exploited continuously since era due to its Adulteration in the market. Adulteration is done by adding various cheaper Adulterants that increases the quality of the milk to make more profit (Chugh and Kour, 2022).

2. COMMON ADULTERATION AND THEIR EFFECTS

The most commonly used adulterants used for the economic purpose includes water, vegetable protein, milk powder, olive oil etc. preservatives like neutralizers usually consist of bicarbonate of soda, washing soda, sodium hydroxide (Paradkar et al, 2000).

Many are very harmful to health it added to the milk as boric acid, benzoic acid, urea, formalin, detergents, ammonium sulphate, hydrogen peroxide & melamine etc.(Sonza et al, 2011).

2.1 Water

Water is the most commonly added adulterant in the milk, it not only reduces the nutritional value of the milk, but the contaminated water further can cause significant health related problems. It is very serious concern. When milk is adulterated with water there is a decrease in the quantity of ions present in the milk and electrical conductivity also get changed (Das et.al. 2016). The contaminated water if added in the milk, it will cause severe health problems especially to infants (Shabir, 2014).

A research has been done to determine the quantity of raw milk in Delhi-NCR to know more about the milk adulterants and its effects. FSSAI in 2011 conducted a survey on milk adulteration in some selected urban and rural areas found that the most common adulterant of milk is water. It is noticed that water is admix with whole milk to increase the volume of milk during summer season, to successfully deal with the demand (Afzal et al, 2014).

2.2 Neutralizers and Salts

Neutralizers such as carbonates, bicarbonates and various alkalis are generally used to mask the pH and acidity values of badly preserved milk passing it off as fresh milk (Faraz et al, 2013).

2.2.1 The most common and harmful neutralizer is Sodium Hydroxide its ingestion may result in a burning

sensation, abdominal pain shock or collapse.

2.2.2 Sodium Carbonate or washing soda can cause severe health hazard if ingested. It may cause irritation along the digestive tract or stomach linings and may cause vomiting and diarrhoea (Palsra et, al, 2019).

2.2.3 It has been reported that high level of sodium chloride in milk could affect the acid base balance in body and may develop regression loss of acquired immunity, kidney problems (Ayub et al, 2007).

2.3 PRESERVATIVES

Formalin, hydrogen peroxide and boric acid are added to milk to increase the shelf life of liquid milk which is very harmful to human being. Milkmen add preservatives to inhibit the microbial growth and increase the shelf life of milk and avoid financial losses (Sinha, 2012).

2.3.1 Formalin in milk causes vomiting diarrhea and abdominal pain, larger dose may cause decreased body temperature, shallow respiration weak irregular pulse and unconsciousness. It also causes blindness by damaging optic nerve and it is carcinogenic in nature (Debnath et al, 2015).

2.3.2 Boric acid causes nausea, vomiting, diarrhea, kidney damage, acute failure of circulatory system and even death (See et al, 2010).

2.3.3 Hydrogen peroxide damages the gastrointestinal cells which can lead to gastritis and inflammation of the intestine. This also disturbs the antioxidants in body and natural immunity hence increasing the ageing (Barhan et al, 2015).

2.4 THICKENING AGENTS

It is interested to know that the middlemen are added thickening agents like starch, sugar, urea etc. to synthetic and natural milk to adjust and or to increase the consistency and viscosity.

2.4.1 High amount of starch can cause diarrhea due to the impacting of indigestible starch in colon and accumulation of indigestible starch in diabetic patients may prove very fatal (Debnath et al, 2015).

2.4.2 To increase specific gravity, viscosity and sweetness of milk, sugar is added which was decreased due to water adulteration (Faraz et al, 2013).

2.4.3 Addition of urea to milk, making the milk looked thick and concentrated giving a feeling of rich milk while, in fact it was low in fat and was poisonous. Urea in milk can cause damage to the kidneys and liver, kidneys are the organs used for the excretion of metabolic wastes and toxins. When urea is added to milk, kidneys are overburdens to filter more urea content than normal (Khan et al, 2015).

Conclusion:

Milk adulteration is a severe problem in both developing and backward countries. Intentionally and unintentionally adulteration of milk is a big reason for many diseases in humans like hormonal disturbances, gastrointestinal diseases and many others. To avoid this problem, we need a proper check and balance and appropriate policies. To protect consumers from the harmful effect of adulteration periodical inspection of markets by inspectors of ministry of health should be control to minimize the risks. Health ministry laboratories facilities need to be supplemented and upgrading to be capable of performing all tests related to it.

Reference:

Swar, S. O., Abbas, R. Z., Asrar, R., Yousuf, S., Mehmood, A., Shehzad, B., Farhan, H. R., Aleem, M. T., Marcelino, L. A. and Mohsin, M. (A review). *Continental Vet. J.*, 1(1), 1-8(2021).
Moore, J.C., Spink, J. and Lipp, M. J. of *Food science* 77, 108-169(2013).
Azad, T. and Ahmed, S. *Int.J. of Food Contamination.* 3, 1-9 (2016).

Xin, H. and Stone, R. *Science* 322, 131(2008).

Chugh, R., Kour, G. *Material Science and Engineering.*1225(2022).

Paradkar, M.M., Singhal, R.S. and Kulkarni, R.R. *Int. J. of Dairy Technology.*53, 92-95(2000).

Sonza, S.S., Cruz, A.G., Walter, E.H.M., Faria, J.A.F., Celeghini, R.M.S., Ferreira, M.M.C., Granato, D. and Sant, A.D.S. *Ana.Food Chemistry.*125, 692-5(2011).

Das, S., Goswami, B. and Biswas, K. *Sens. Lett.*14, 4-18(2016).

Shabir, G.B. *J. Food Nutr. Sci.* 2, 47(2014).

Afzal, A., Mahmood, M.S., Hussain, I. and Akhtar, M. *Pakistan J. food Nut.Sci.* 2, 47(2014).

Faraz, A. Lateef, M., Mustafa, M.I., Akhtar, P., Yaqoob, M. and Rehman, S.J. of *Animal and Plant sciences.*23, 119-24 (2013).

Palsra, T., Khurana, S.K. and Mane, B.G. *J. of Food Res. and Tech.* 7(1) ,4-8(2019).

Ayub, M., Abbas, M., Qazi, I.M. and Khattak, I.A., Sarhad, J. of *Agriculture.*23, 1127(2007).

Sinha, K. 70% of milk in Delhi, country is adulterated consultancy- Report. (2012).

Debnath, A., Banerjee, S., Rai, C. and Roy, A. *Int. J. of Res. in App. Natural and social sciences.* 3,81- 88(2015).

See, A.S., Salleh, A.B., Baker, F. A., Yusuf, N.A., Abdulmir A. S. and Lee, Y. H. *American J. of App. sciences.*7,620-27 (2010).

Barhan, G.S., Khaskheli, M., Soomro, A. H. and Nizamani, Z.A. *Advances in Biochemistry and Biotechnology.*1, 1-16 (2015).

Khan, K. M., K. M. Krishna, K. M., Majumdar, H. and Gupta, P. K. *Food Analytical methods.*8, 93-102 (2015).