

Dairy Products and their Adulteration

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Abstract

Food is related to health and well being. Good food is well balanced that gives our body all that it needs. It is directly linked with growth but adulteration and malnutrition affects youngster's growth. Food adulteration is a common issue whereas the developing countries are at high risk because of lack of supervision and neglecting policies. Unfortunately, milk adulterants can cause serious health problems such as allergy, renal calculi, and stomachitis. Today there is science era, so recent development in these detection techniques has been reported that included various tests to identify specific adulterant. This article creates awareness among us towards some commonly used adulterants and their simple detection techniques to get the power to make right choice to select their healthy food.

Keywords: Adulteration, health problems, detection techniques

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DEFINITION

A **Dairy product** is a food produced from the milk of mammals. A production plant for the processing of milk is called **dairy**.

Milk and milk products are some of our oldest and best known natural foods. They are rich sources of energy.

Raw milk for processing generally comes from cows, but occasionally from other mammals such as goat, sheep and buffalo. Water is the main constituent of milk.

LIST OF HEALTHY DAIRY PRODUCTS—SEVEN MOST NUTRITIONAL PRODUCTS

List of healthy dairy products—common forms of milk:

- Fresh milk
- Condensed milk
- Milk powder

Some healthy dairy products:

- *Milk whey*: Fat cream scum floating on surface of fresh milk.
- Yogurt
- Cheese
- Butter

RESEARCHES RELATED TO DAIRY PRODUCTS

Milk and dairy products are not necessary in diet and can in fact be harmful to health.

1. *Higher dairy intake has been linked to higher ovulation' cancer risk:* The relation between dairy product and ovarian cancer may be caused by breakdown of milk sugar lactose into galactose; a sugar may be toxic to ovarian cells. The Iowa women's health study found that women who consumed more than one glass of milk per day had 73% greater chance of developing ovarian cancer than woman who drank less than 1 glass per day.
2. *High-fat dairy products linked to reduced type-2 diabetes risk and obesity:* Researchers found that high fat dairy had an 8% lower chance of becoming obese as compared to those who ate less. The fat can improve satiety and that could reduce total calorie intake. Those who ate the most high-fat dairy products had 23% lower risk of developing type-2 diabetes than those who ate less.
3. *Give up dairy products to beat cancer:* Products such as milk, cheese can successfully be used to help stop the disease by depriving cells of conditions they need to grow.
4. *Higher dairy intake is linked to increased risk of prostate cancer:* The risk of prostate cancer is related to increase in insulin like growth factor (IGF) level, which is high in cow's milk. Men with highest levels of IGF-1 had four times more risk of prostate cancer.

5. *Higher milk intake is linked to acne*: IGF in milk causes inflammation in humans, which leads to acne (redness and swelling).

ADULTERATION

Food adulteration is an act of intentionally debasing the quality of food offered for sale either by the admixture or substitution of inferior substances or by the removal of some valuable ingredient. Food adulteration takes into account not only the intentional addition or substitution or abstraction of substances which adversely affect nature, substances and quality of foods, but also their incidental contamination during the period of growth, harvesting, storage, processing, transport and distribution [1, 2].

Adulterant

“Adulterant” means any material which is or could be employed for making the food unsafe or substandard or misbranded or containing extraneous matter [3].

Food is adulterated if its quality is lowered or affected by the addition of substances which are injurious to health or by the removal of substances which are nutritious. It is defined as the act of intentionally debasing the quality of food offered for sale either by the admixture or substitution of inferior substances or by the removal of some valuable ingredient.

Food is declared adulterated if [1]:

- A substance is added which depreciates or injuriously affects it.
- Cheaper or inferior substances are substituted wholly or in part.
- Any valuable or necessary constituent has been wholly or in part abstracted.
- It is an imitation.
- It is coloured or otherwise treated, to improve its appearance or if it contains any added substance injurious to health.
- For whatever reasons its quality is below the Standard

Adulterated Milk

Adulterated milk means milk mixed with toxic additives to change the consistency.

Common Adulterants Found in Milk

Adulteration of milk reduces the quality of milk and even makes it hazardous. Adulterants such as soap, acid, starch, chemicals may be added

to the milk. Most of its chemicals used as adulterate are poisonous and cause health hazards [4].

1. *Water*: The presence of water can be detected by putting a drop of milk on a polished slanting surface. The drop of pure milk flows slowly leaving a white trail behind it, whereas milk adulterated with water will flow immediately without leaving a mark [1].
2. *Table Sugar*: The common sugar present in the milk is lactose. The fat content of the milk is more compared to protein content. Table sugar like sucrose is added to milk to increase the carbohydrate content of milk and thus the density of the milk.
3. *Starch*: Milk contains relatively large amount of fat. Addition of carbohydrate to milk increases its fat present in milk. Starch is one such component that is added to adulterate milk.
4. *Urea*: Provide whiteness, increases the consistency of milk for Solid-Not Fat (SNF)%age to imitate natural milk.
5. *Acids*: Generally acids such as benzoic acids and salicylic acid is used as preservative in food industry. It is added to milk to preserve and thus increase the shelf life of milk.
6. *Soap*: Soap is added to milk to increase the foaming of milk and thus to have thick milk.
7. *Formalin*: Formalin is a preservative and can preserve milk for long period of time.
8. *Ammonium Sulphate*: Ammonium sulphate is added to milk as it increases the lactometer reading by maintaining the density of milk.

Health Hazards Effects of Milk Adulterants

Adulterated food is dangerous because it may be toxic and can affect health and it could deprive nutrients essential for proper growth and development.

1. Formalin: Liver damage.
2. Acids: Asthma and increased level of hyperacidity.
3. Water: Reduces nutritional value.

Detection of Adulteration at Home or Community [5]

1. *Detection of water in milk*: The presence of water can be detected by putting a drop of

milk on a polished surface. The drop of milk flows slowly leaving a white trail behind it, whereas milk adulterated with water will flow immediately without leaving a mark.

2. *Detection of starch:* Add a few drops of tincture of iodine or iodine solution; formation of blue colour indicates the presence of starch.
3. *Urea:* Take a teaspoon of milk in a test tube. Add ½ spoon of soybean or arhar powder. Mix up thoroughly by shaking the test tube. After 5 min, dip a red litmus paper in it. Remove the paper after ½ min. A change in colour from red to blue indicates the presence of urea in milk.
4. *Detergent:* Shake about 5–10 ml of sample with an equal amount of water. Lather indicates the presence of detergent.
5. *Synthetic milk:* Synthetic milk has a bitter taste, gives a soapy feeling on rubbing between fingers and turns yellowish on heating.
6. *Test for glucose sugar:* Take a strip of diacetic strip and dip in the sample of milk for 30 sec to 1 min. If the strip changes colour, then it shows the sample of milk contains glucose. If no colour changes, glucose is absent.
7. *Tests for milk products: Khoa and its products:* Boil a small quantity of sample with some water and add few drops of iodine solution. Formation of blue color indicates presence of starch.
 - *Paneer:* Boil a small quantity of sample with some water, cool and add a few drops of iodine solution. Formation of blue color indicates presence of starch.
8. *Tests for ghee:* Take small amount of ghee or butter in test tube and heat it up. Take small amount of sugar and dissolve it in 10 ml of HCl. Now add the solution to mixture of butter and ghee. If it turns red, then ghee/butter is adulterated [6].
9. *Tests for other foods:*
 - *Turmeric powder, dals and pulses:* Take a spoon of dal, turmeric or besan powder and let it dissolve in lukewarm water. Add a few drops of HCl to it. If it turns pink, violet or purple it shows metanil yellow is present in it.
 - *Sugar:* Take a spoon of sugar, dissolve it in water and allow it to settle. Sugar

will dissolve in water, while chalk will not and thus remain as residue at the bottom.

- *Mustard oil:* Take small amount of mustard oil in a test tube; add few drops of nitric acid to it. Shake and heat the mixture for 2–3 min. Appearance of red colour indicates argemone oil is added to mustard oil.

CONCLUSION

Section of wholesome and nonadulterated food is essential for daily life to make sure that such foods are beneficial for our health. It is not only possible that we make the difference between adulterated and nonadulterated through observation method although it included various adulterants during its preparation. However, observation method is only to examine the absence of insects, visual fungus, etc. Secondly label declaration on packed food is important for knowing its ingredients (nutritional value), freshness of food and period of best before use. Consumer avoids taking food products from unhygienic place or food prepared under unhygienic condition. It is always better to buy certified foods from registered areas. At last we would like to conclude that the primary means of controlling incidence of adulteration is stringent quality control and strict adherence to good manufacturing practices.

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