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## Adulteration In Food: An Overview

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**Abstract :** Health is wealth. Food is basic necessity of life. People need to be cautious to keep their health well. Food is substance consumed other than water and drugs for maintaining the health, wellbeing and vitality of the individual. The selection of foods best suited for promoting good health has been found out of by trial and error by continued use. Food products are often a target of adulteration while supply chains usually deal with perishable products that could be harmful to consumers if they are not managed properly. Economic adulteration is a long term problem affecting the food industry. Adulteration in food has been a concern since the beginning of civilization, as it not only decreases the quality of food products but also results in a number of ill effects on health. Food adulteration involves the infusion of useless, harmful, unnecessary substances to food which decreases the quality of food. The problems of adulteration makes the food items used in our daily life unsafe and unhygienic for use due to poor handling. Adulteration in food items can cause tremendous affect on health without our knowledge. Adulterants used are, in fact, poisons in one way or other. Regular use of these substances will lead hazards health defects.

**Key words:** Food substances, adulteration, health hazard.

## Introduction

Health is an end in itself but it is a means to reach an end. WHO defined Health as a state of complete physical, mental and social well-being not merely the absence of disease or infirmity (WHO report 1978). Health is an important part of human life. Human life is always in the verge of collapse in absence of a sound health with healthful living. The word "Adulteration" is a legal term meaning that a food produced fails to meet federal or state standards. Adulteration is an addition of a non food item to increase the quality of the food item in raw form or a prepared form which may result in the loss of actual quality of food item among meat and meat products one of the items used adulteration and water, dead carcasses.

Food safety is of primary concern to food agricultural organization (FAO) and world health organization (WHO). Food safety providing assurance that food will not cause harm to the consumer when it is prepared and /or eaten according to its intended use. Food safety is a function of the nature of technology used to produce and process food. It can be manipulated through genetic improvement, agronomic practices and postproduction storage and processing. The aim of study is to know/awareness of the type of adulteration, health hazards of adulterant and control approaches among the people.

## Food Adulteration

Food adulteration is a process in which the quality of food is lowered or reduced by replacing food ingredient or addition of non authenticated substances or removal of a vital component from food for the sake of earning profit or due to other incidental reasons. It ultimately deceives consumers and leads various health risks. It is very difficult for the consumer to select one food item because of misleading advertisements, improper media emphasis and food adulteration. Food can be adulterated intentionally and accident. An adulterant is a chemical substance which should not be contained within other substance. The addition, replacement and removal of adulterant/other ingredient is called adulteration. Food additives are not adulterants, if present within the specific limits. In exceeded limits they become significant adulterants and can cause serious health hazards to the consumer's food. Adulteration are chemical substance added to processed foods (i) to enhance /retain quality attributes such as texture, physical properties, taste, flavour etc. (ii) to control the spoilage and enhance shelf life of the processed foods. Food additives include Antioxidants, emulsifiers/stabilizers, preservatives, anti caking agents, artificial sweeteners, bulking agents, acid regulators, leavening agents, flavouring agents, glazing agents.

## Intentionally Added Substances

These are added intentionally to the food generally are small quantities to improve its appearance colour and flavours, taste, texture or storage properties. This substance may be as follows:

- Colouring agent e.g. turmeric, saffron etc
- Flavoring agent e.g. vanilla essence
- Sweetener e.g. saccharin
- Preservatives e.g. sodium, Benzoate etc.

These agents are generally considered for human consumption uncontrolled or in discriminate use of food additives may cause health hazards. Generally the processed foods such as breads, cakes, biscuit, sweets, toffees, jams, tallies, soft drink, ice creams and refined, oil etc contain food additives.

## Contaminants Incidental /Accidentally

These are added to the food to the incidentally during cultivation as insecticide process of food preparation through packing of food through environmental conditions. Adulteration of food is done through the following methods:

- Mixing
- Substitution
- Abstraction
- Concealing the quality

## Another cause of food adulteration

The causes of adulteration may be, following are the reasons for adulteration:

- i) Increase the value of commercial attributes/characteristics of the products.
- ii) Sometimes adulteration, even though not hazardous, may lead to severe contamination issues.
- iii) Blending is not adulteration, unless origin of the product is significant.
- iv) When supply is less than demand, to earn more profits.
- v) Shortage of authentic ingredients at affordable prices.
- vi) Inadequate knowledge on the consequences and associated food safety risks.
- vii) Lack of awareness and updating of the information on the adulteration related food safety outbreaks.
- viii) Availability of too many products in the market

- ix) Poor buying practices of consumers.
- x) Consumer mentality of bargaining,
- xi) Availability of adulterants.

**Table. Some examples of various types of adulterants**

Adulterants	Examples
Food contaminants	3-MCPD, Aldicarb, Cyanide, Formaldehyde, Lead poisoning, Melamine, Mercury in fish.
. Flavourings	Monosodium glutamate (MSG), Salt, Sugar
Preservatives	Benzoic acid, Ethylene diamine tetraacetic acid (EDTA), Sodium benzoate
Pesticides	Chlorpyrifos, DDT, Lindane, Malathion, Methamidophos
Toxins/poisons	Aflatoxin, Arsenic contamination of groundwater, Benzene in soft drinks, Bisphenol A, Mycotoxins, Shellfish poisoning

### Various food items and their adulterants

Almost every food-item from milk to fruits, from vegetables to grains is adulterated at some level. Some adulterants enter via agricultural steps, as they are not cleaned well. These are visible adulterants like stones, leaves, soil and dust to name a few. The consumer can clean them and this makes it less harmful. Other adulterants that are intentionally added are invisible or they are made invisible. They are generally harmful for the health and most of them lead to serious health problems like cancer. Even animal feed like cake as protein supplement for lactating animals is adulterated accounts about 90 percent of un-branded loose forms. Some adulterants are added in food products which are given as follows:

## 1. Milk

The milk was adulterated with diluted water, detergent, fat and even urea. Some of the adulterants that are used in milk are water, chalk, urea, caustic soda and skimmed milk, while Khoya is adulterated with paper, refined oil and skimmed milk powder. The level of adulteration in milk is dangerous to so many levels and has the highest chance of causing stomach disorders.

## 2. Tea/Coffee

Generally, Tea and coffee are two most used beverages and thus highly adulterated. Tea leaves are usually adulterated with same coloured leaves, some might not even be edible. Several cases of liver infection across the country have been reported due to consuming adulterated tea. Coffee seeds, on the other hand are adulterated with tamarind seeds and mustard seeds. These adulterants are the main cause of diarrhoea.

## 3. Wheat and other food grains

Everybody knows that wheat is very commonly adulterated with ergot, a fungus containing poisonous substances and is extremely injurious to health.

## 4. Vegetables

Different coloured and textured vegetables are often coloured with different dyes and substances. These vegetables are mostly adulterated with malachite green, a chemical dye which is known to have carcinogenic. Common adulterants in fruits and vegetables are oxytocin sachharin, wax, calcium carbide and copper sulphate.

## 5. Sweets

The most common ingredients in making these sweets are khoya and chenna and they're often adulterated with starch. If the sweets are adulterated by boiling a small sample in water, cool it then add a few drops of iodine solution. A blue colour indicates the presence of starch. Also, sugar used in making these sweets might be adulterated with tar dye which only makes it worse.

## 6. Honey

There are so many varieties of honey available in the market, but due to its steep price, honey is commonly adulterated with molasses sugar to increase the bottle quantity. According to a study carried out by the Centre for Science and Environment, most honey brands being sold in the country contain varying amounts of antibiotics and their consumption over time could induce resistance to antibiotics, lead to blood-related disorders and injury to the liver.

## 7. Dal

The most commonly adulterated dal is arhar dal and is usually adulterated with metanil yellow. Metanil yellow is a principal non-permitted food colour used extensively. The effect of long-term consumption of metanil yellow on the developing and adult brain causes neurotoxicity.

Neurotoxicity occurs when the exposure to natural or artificial toxic substances. These symptoms change the normal activity of the nervous system in such a way as to cause damage to the nervous tissue. Metanil yellow is used in dal as an adulterant for colouring. Its presence can be tested in dal by adding a few drops of HCl to a test sample, if the solution turns pink in colour, it indicates the presence of metanil yellow.

## 8. Spices

Soap stone or other earthy material and foreign resin the common adulterant used in Asafoetida. Papaya seeds, black berries are the common adulterant used in black pepper as they are almost similar in size but tasteless (sometimes bitter). Red chilli powder is adulterated with brick powder, salt powder or talc powder and artificial colours like Sudan Red. Adulterants like metanil yellow (an artificial color) is used to intensify the color of the turmeric powder also adulterants like chalk powder, brick powder and toxic substances are added to gain profit and to lower the cost so as to compete with the market.

## 9. Butter and cream

Butter can be diluted with water or partially replaced with cheaper plant oils such as palm oil, sunflower oil and soybean oil. This increases the profits derived from a given volume of milk.

## 10. Ice cream

Most common adulterants in ice cream are ethyl acetate, butraldehyde, nitrate, washing powder etc are not less than poison. Ethyl acetate causes terrible diseases affecting lungs, kidneys and heart. Ice cream is manufactured in extremely cold chamber where fat is hardened and several harmful substances are added. Also a kind of gum is added which is sticky and slow melting. This gum is obtained by boiling animal parts like tail and the nose etc.

## 11. Adulteration of Fats and Oils

It is easy to adulterate oils and fats. Majority of fats, oils and butter are paraffin wax, castor oil and hydrocarbons. But it is difficult to detect such adulteration. Ghee is often mixed with hydrogenated oils and animal fats. Synthetic colors and flavours are added to other fats to make them appear like ghee.

## 12. Food Grain Adulteration

Food grain adulteration involves mixing sand or crushed stones to increase the weight of food grains. Cereal grains and pulses are mixed with plastic beads that resemble grains in color and size. Very often, water is also sprayed on grains to increase the weight.

### Conclusions

Food adulteration is a great cause of concern as it affects human health directly. Food adulteration is a socio-economic crime, a mode of adulteration is harmful for human beings and source of profits is for businessmen who are involved in adulteration activities.

For adulteration controls, integrated approach through statutory and regulatory authorities, industry, scientific community, consumer guidance, voluntary agencies, proper counseling and IECT (Information, Education, Communication and Training) materials can play a vital role. While purchasing food items, selection of wholesome and non-adulterated food is necessary to make sure that such food do not cause and health problems. Though presence of adulterants cannot be ensured by visual examination as toxic contaminants are present in very low level but visual examination before purchase can ensure absence of insects, fungus and other foreign materials. Both local and branded food stores should be inspected by government bodies. Henceforth, there is a critical need of stringent regulation and applicability of strict rules for production of better food quality products to the consumers.

If we tend to actively participate in these changes then we can bring about a healthy and non venturous future for the upcoming generations.

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