

## Review on adulteration of food and its effect on health

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### ABSTRACT –

Adulteration is a legal term meaning that a food product fails to meet the legal standards. One form of adulteration is an addition of another substance to a food item in order to increase the quantity of the food item in raw form or prepared form, which may result in the loss of actual quality of food item. That means Food adulteration is an act of adding or mixing of poor quality, inferior, harmful, substandard, useless or unnecessary substances to foods. These substances may be either available food items or non-food items. Among meat and meat products some of the items used to adulterate are water or ice, carcasses, or carcasses of animals other than the animal meant to be consumed. This act of spoiling the nature and quality of food items is considered food adulteration. Despite various measures and penalties, the problem continues to remain a big challenge for the country. Consumers around the country are increasingly more stringent laws besides

demanding information on the source and reassurance of the origin and details on reprocessed food. So Every consumer first should try to prevent themselves from these adulteration to have healthy life.

**KEYWORDS:** Adulterant, Food additive, FDA, Argemone oil, Dangerous health effects,

### INTRODUCTION –

Food is essential for sustenance of life. We all eat food and gain energy for different metabolic activities. All living organisms need food for growth, work, repair, and maintaining life processes. There are different types of food available today in the market, and on a daily basis, we all depend on various food sources, including vegetables, fruits, cereals, pulses, legumes, etc. As we buy fresh veggies and other groceries, we might have come across the small pebbles in cereals and grains, darkly stained vegetables like cabbage, broccoli, fruits,

dark red meat, and a lot more. Adulteration or contamination of natural food products is one of the major challenges in today's society. Despite various actions and penalties, the practice of adding adulterant is quite common in developing countries. There are various methods used for adulterating the natural products. Food Adulteration can be defined as the practice of adulterating food or contamination of food materials by adding few substances which are collectively called the adulterants.<sup>1</sup> Adulterants are the substance or poor quality products added to food items for economic and technical benefits. Addition of these adulterants reduces the value of **nutrients** in food and also contaminates the food, which is not fit for consumption. These adulterants can be available in all food products which we consume daily, including dairy products, cereals, pulses, grains, meat, vegetables, fruits, oils, beverages etc. The process of contaminating food or adding to the food components is a common phenomenon in developing countries.

For instance: Milk can be diluted by adding water to increase its quantity and starch powder is often added to increase its solid content.

Main reasons for adulterating food products are :

- Practised as a part of the business strategy.
- An imitation of some other food substance.
- Lack of knowledge of proper food consumption.
- To increase the quantity of food production and sales.

- Increased food demand for a rapidly growing population.
- To make maximum profit from food items by fewer investments.

Adulteration is an illegal practice of adding raw and other cheaper ingredients to the excellent quality products to increase the quantity. Having this adulterated food is highly toxic and leads to several health issues, including certain nutrition **deficiency diseases**, kidney disorders, and failure of an individual's organ systems, including heart, kidney, and liver.<sup>2</sup>

### AIM AND OBJECTIVES –

To study the adulteration of food and its effects on health

### Material and Methods:

Review of Classical Text of *Ayurveda* as well as Allopathic Medicines and Recent studies available on various concern websites.

### REVIEW OF LITERATURE -

#### How did adulteration initiate? –

Adulteration of food is a very serious anti-social act as it poses a major health hazard. Lack of awareness among people, corrupt officials, even the police sometimes, is the reason why spurious food products continue to hit the shelf.<sup>3</sup> Normally the contamination/adulteration in food is done either for financial gain or due to carelessness and lack in proper hygienic condition of processing, storing, transportation and marketing. This ultimately results that the consumer is either cheated or often become victim of diseases. Such types of adulteration are

quite common in developing countries or backward countries. It is equally important for the consumer to know the common adulterants and their effect on health. The increasing number of food producers and the outstanding amount of import foodstuffs enables the producers to mislead and cheat consumers. To differentiate those who take advantage of legal rules from the ones who commit food adulteration is very difficult. The consciousness of consumers would be crucial. Ignorance and unfair market behavior may endanger consumer health and misleading can lead to poisoning. Every consumer wants to get maximum quantity of a commodity for as low a price as possible. This attitude of the consumer being coupled with the intention of the traders to increase the margin of profit, where the quality of the commodity gets reduced through addition of a baser substance and / or removal of vital elements also commonly known as food adulteration.

#### **Basic criteria for determination of adultration –**

1. If the food bears or contains any "poisonous or deleterious substance" which may render it injurious to health;
2. It bears or contains any added poisonous or added deleterious substance (other than a pesticide residue, food additive, color additive, or new animal drug, which are covered by separate provisions) that is unsafe;
3. Its container is composed, in whole or in part, of any poisonous or deleterious substance which may render the contents injurious to health; or
4. It bears or contains a pesticide chemical residue that is unsafe. (Note: The Environmental Protection Agency [EPA] establishes tolerances for pesticide residues in foods, which are enforced by the FDA)<sup>4</sup>
5. It is, or it bears or contains, an unsafe food additive;
6. It is, or it bears or contains, an unsafe new animal drug;
7. It is, or it bears or contains, an unsafe color additive
8. It consists, in whole or in part, of "any filthy, putrid, or decomposed substance" or is otherwise unfit for food; or
9. It has been prepared, packed, or held under unsanitary conditions (insect, rodent, or bird infestation) whereby it may have become contaminated with filth or rendered injurious to health.
10. It has been irradiated and the irradiation processing was not done in conformity with a regulation permitting irradiation of the food in question (Note: FDA has approved irradiation of a number of foods, including refrigerated or frozen uncooked meat, fresh or frozen uncooked poultry, and seeds for sprouting .
11. It contains a dietary ingredient that presents a significant or unreasonable risk of illness or injury under the conditions of use recommended in labeling (for example, foods or dietary supplements containing aristolochic acids, which have been linked to kidney failure, have been banned.);
12. A valuable constituent has been omitted in whole or in part or

replaced with another substance; damage or inferiority has been concealed in any manner; or a substance has been added to increase the product's bulk or weight, reduce its quality or strength, or make it appear of greater value than it is (this is "economic adulteration"); or

13. It is offered for import into the United States and is a food that has previously been refused admission, unless the person reoffering the food establishes that it is in compliance with U.S. law

The Federal Food, Drug, and Cosmetic (FD&C) Act (1938) provides that food is "adulterated" if it meets any one of these criteria. The Federal Meat Inspection Act and the Poultry Products Inspection Act contain similar provisions for meat and poultry products.<sup>5</sup>

#### **Economic Adulteration –**

A food is adulterated if it omits a valuable constituent or substitutes another substance, in whole or in part, for a valuable constituent (for instance, olive oil diluted with tea tree oil); conceals damage or inferiority in any manner (such as fresh fruit with food coloring on its surface to conceal defects); or any substance has been added to it or packed with it to increase its bulk or weight, reduce its quality or strength, or make it appear bigger or of greater value than it is (for example, scallops to which water has been added to make them heavier).

Various metallic poisons formerly occurred in food stuffs as dyes, preservatives or colouring matter. Such

severe poisoning is not common nowadays.<sup>6</sup>

#### **Some common examples of adulteration –**

- Majority of fats, oils and butter are paraffin wax, castor oil and hydrocarbons.
- Red chilli powder is mixed with brick powder and pepper is mixed with dried papaya seeds.
- Common adulterants present in ghee and oil are paraffin wax, hydrocarbons, dyes and argemone oil .
- Coal-tar colours are employed a great deal, pickles and canned vegetables are sometimes coloured green with copper salts; butter is made more yellow by anatta.
- Turmeric is used in mustard and some cereal preparations.
- Apples are the basis for many jellies, which are coloured so as to simulate finer ones.
- In confectionery, dangerous colours, such as chrome yellow, prussian blue, copper and arsenic compounds are employed.
- Yellow and orange-coloured sweets are to be suspected.
- Artificial flavouring compounds are employed in the concoction of fruit syrups, especially those used for soda water.
- Milk is adulterated with water, and indirectly by removing the cream.
- The addition of water may introduce disease germs.

- Cream is adulterated with gelatin, and formaldehyde is employed as a preservative for it.
- Butter is adulterated to an enormous extent with oleomargarine, a product of beef fat.
- Brick dust in chilli powder, coloured chalk powder in

turmeric, injectable dyes in watermelon, peas, capsicum, brinjal, papaya seeds in black pepper etc.

### **Injurious Adulterants/ contaminants in foods and their health effects –**

<b>Adulterant</b>	<b>Foods commonly involved</b>	<b>Diseases or health effects</b>
Foreign leaves or exhausted tea leaves, saw dust artificially coloured	Tea	Injurious to health, cancer
TCP	Oils	Paralysis
Sand, marble chips, stones, filth	Food grains, pulses etc	Damage digestive tract
Mineral oil (white oil, petroleum fractions)	Edible oils and fats, Black pepper	Cancer
Lead chromate	Turmeric whole and powdered, mixed spices	Anemia, abortion, paralysis, brain damage
Arsenic	Fruits such as apples sprayed over with lead arsenate	Dizziness, chills, cramps, paralysis, death, wrist drop
Mercury	Mercury fungicide treated seed grains or mercury contaminated fish	Brain damage, paralysis, death
Flouride	Drinking water, sea foods, tea, etc.	Excess fluoride causes fluorosis (mottling of teeth, skeletal and neurological disorders)
Pesticide residues (beyond safe limit)	All types of food	Acute or chronic poisoning with damage to nerves and vital organs like liver, kidney, etc.
Antibiotics (beyond safe limit)	Meats from antibiotic-fed animals	Multiple drug resistance hardening of arteries, heart disease
Oxalic acid	Spinach, amaranth, etc.	Renal calculi, cramps, failure of blood to clot

## Enforcement Actions against adulterated food –

- If a food is adulterated, FDA and FSIS have a broad array of enforcement tools.
- These include seizing and condemning the product detaining imported product, enjoining persons from manufacturing or distributing the product, or requesting a recall of the product.
- Enforcement action is usually preceded by a Warning Letter from FDA to the manufacturer or distributor of the adulterated product.
- In the case of an adulterated meat or poultry product, FSIS has certain additional powers. FSIS may suspend or withdraw federal inspection of an official establishment.<sup>7</sup>
- Without federal inspection, an establishment may not produce or process meat or poultry products, and therefore must cease operations.
- With the exception of infant formula, neither FDA nor FSIS has the authority to require a company to recall an adulterated food product. However, the ability to generate negative publicity gives them considerable powers of persuasion.
- State regulators generally have similar enforcement tools at their disposal to prevent the manufacture and distribution of adulterated food.
- In addition, many states have the authority to immediately embargo

adulterated food and to impose civil fines.

- Federal agencies often will coordinate with state or local authorities to remove unsafe food from the market as quickly as possible.
- Several agencies have been set up by the Government of India to remove adulterants from food stuffs.
- **AGMARK** – acronym for **agricultural marketing**....this organization certifies food products for their quality.<sup>8</sup>
- Its objective is to promote the Grading and Standardization of agricultural and allied commodities.
- Selection of wholesome and non-adulterated food is essential for daily life to make sure that such foods do not cause any health hazard.
- It is not possible to ensure wholesome food only on visual examination when the toxic contaminants are present in ppm level. However, visual examination of the food before purchase makes sure to ensure absence of insects, visual fungus, foreign matters, etc.
- Therefore, due care taken by the consumer at the time of purchase of food after thoroughly examining can be of great help.
- Secondly, label declaration on packed food is very important for knowing the ingredients and nutritional value. It also helps in checking the freshness of the food and the period of best before use

## DISCUSSION –

Food adulteration is a very old and common problem, which is often seen in both the low- and middle-income countries and sometimes even in some developed countries. The problem level is greater in low-economic zone like Bangladesh, Indonesia, India, Vietnam, and African countries. Consumers are helpless in front of unlawful acts of some unscrupulous importers, producers, wholesaler, or retailers, simply to increase profits with less capital and equipment. Hazardous chemicals such as calcium carbide, Sodium cyclamate, cyanide, and formalin are widely used for ripening green tropical fruits, to keep them fresh, and for preserving until sale<sup>9</sup>. Low-cost textile dyes are used in coloring vegetables, fruits, popular sweetmeats, soft drinks, beverages, confectionaries to draw customers' attention. Fishmongers are preserving fish with formalin to keep the body solid to cover up internal decomposition. Intake of such types of chemically treated food may cause complex diseases and has direct consequences such as liver and kidney failure, autism, metabolic dysfunctions, and cancer.<sup>10</sup>

### What can we do for preventing ourselves from the illeffects due to adulterated food? –

- Food Adulteration occur in rural as well as urban areas. So the first option is to buy branded and ISI-marked products.
- Even if these branded items cost a little extra, it is worth paying the

extra amount to safe guard your health.

- If you have purchased any branded item and doubt its quality, you can at least approach the company concerned.
- Complain to Prevention of Food Adulteration Department in your city / town / district and report to the newspapers and make more and more people aware to take joint action.
- Always remember to preserve your grocery bills so that the company can take necessary steps regarding the complaint.
- If any person manufactures for sale, stores, sell imports or distributes any article of food which is adulterated or misbranded, he is liable under the PFA Act to be punished with imprisonment and fined.
- If you find that any food is adulterated, then do not keep silent.
- Avoid dark coloured, junk and other processed foods.
- Make sure to clean and store all the grains, pulses and other food products.
- Wash fruits and vegetables thoroughly in running water before it is used.
- Check the seal is valid or not, before buying the food products like milk, oil, and other pouches.
- Always make sure to check and buy products having an FSSAI-validated label, along with the license number, list of ingredients, manufactured date, and its expiration.

According to the National Health Service and Food Research Institute, several food products have been adulterated to increase the quantity and make more profit. This practice of adding adulterants to food products are quite common in all in developing countries and other backward countries. Every year, the 7th of April is celebrated as the World Health Day globally and as per the reports, WHO is aimed to bring a general awareness about the adulterations of food products, motivate and inspire everybody to have a healthy, balanced diet.

## CONCLUSION -

Protecting the health of the consumer along with rights must be the primary goal. Besides, preventing fraud or wrong practices are important and challenging issues facing the food industry. So, the food industry and manufacturers must take also perform their part to curb the menace of food adulteration. Also every consumer should always be careful while selecting food items so that we can prevent our health from ill effects of food adulterants.

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