FOOD ADULTRATION: adulterants, health hazards, methods of detection.

Food Adulterations

- Food adulteration has become a very common practice in our country and we are consuming these foods almost everyday, which have numerous harmful effects to our health. Every day we watch in the TV news how the unhygienic and spurious foods are entering into our houses. Adulteration of foods has many effects on individuals as well as on the community health.

- The usage of adulterants has been common in societies with few legal controls on food quality and/or poor/nonexistent monitoring by authorities; sometimes this usage has even extended to exceedingly dangerous chemicals and poisons. eg. Coloring of Cheese(s) with Lead

Food adulterations

Food adulteration means anything adding or subtracting with food making it injurious to health. This adulteration may be done intentionally or unintentionally. Intentional adulteration is a criminal act and punishable offense. Or the process of lowering the nutritive value of food either by removing a vital component or by adding substances of inferior quality.

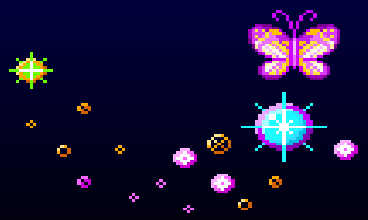
Types of adulteration:

- There are three types of adulteration namely:

1. *Intentional adulterants:*

2. *Metallic contamination:*

3. *Incidental adulterants:*



Intentional adulterants

- Intentional adulterants are sand, marble chips, stone, mud, chalk powder, water, mineral oil and coal tar dyes. This adulteration cause harmful effects on the body.

Metallic contamination

- *Metallic contaminations* include arsenic from pesticides, lead from water, and mercury from effluents of chemical industries, tin from cans.

Incidental adulterants

- Incidental adulterants *are* pesticide residues, tin from can droppings of rodents, larvae in foods. Metallic contamination with arsenic lead, mercury can also occur incidentally. Pests such as rodents and insects intrude into the food at high degree and produce filth in the form of excreta, bodily secretions and spoilage through microorganisms. The most common incidental adulterants are pesticides, D.D.T and marathon residues present on the plant product. The maximum permissible residue allowed for D.D.T, marathon is 3 ppm

Food Adulterations Categories

- **Replacement:** Complete or partial replacement of a food ingredient or valuable authentic constituent with less expensive substitute with the intention of circumventing on *"origin" and false declaration of the "process"*.

- **Addition:** Addition of small amounts of non-authenticated substances to mask inferior quality ingredient.

- **Removal:** Removal of authentic and valuable constituent without purchasers knowledge

Food Adulterations

Some common adulterants and the diseases caused by them:

Milk : Cow/buffalo milk can be adulterated with starch, milk powder and urea

- Health effect: Cancer or acute renal failure

Tur dal, Turmeric powder, mixed spices, saffron

- Tur dal, Turmeric powder, mixed spices, saffron.

- Adulterants : Metanil yellow, a non-permitted color is a common adulterant in food items like laddu, tur dal and turmeric.

- Health effect: tumor and cancer

Ghee

- Adulterants: Ghee essence is used in cheap er oils and passed off as pure ghee. This type of ghee will not solidify like normal ghee. It may also not have that grainy texture of pure ghee.
- Oleomargarine or lard - added to butter..
- Health effect:
- Cancer or acute renal failure.
- The argemone oil used to adulterate ghee and butter is highly toxic. It causes a disease known as dropsy. Watery fluid collecting in some parts of the body is the main symptom. It affects the normal functioning of the body. It may also paralyse the limbs.

Sugar and Salt

- Adulterants: With chalk powder and white sand ,may cause stomach disorder.

- Health effect: Stomach disorder

Tea powder

- Adulterants : With used tea leaves, dye or artificial colour, iron fillings.
- Tea- coloured tea leaves after removing the essence.

- Health effect: Cancer, tetanus

Chilli powder

- Adulterants: Chilli powder: Sudan red, red brick powder, grit, sand, dirt, non-permitted colors, saw dust or use dry papaya seeds to obtain the required color.

- Health effect: Stomach disorder

Sudan dye is carsinogenic

Sweets

- Adulterants : Metanil yellow used to brighten the colour of pulses, turmeric powder and sweetmeats, is colours not permitted.

Health effect :tumor and cancer

Mustard seeds and vegetable oil

- **Adulterants :** Argemone seeds and argemone oil
- **Health effect:** Epidemic dropsy

Honey

- **Adulterants:** Jaggery, Sugar, Corn syrup
- **Health effect:** Obesity, Diabetes mellitus, Eyes and nerve damages

Adulterationon bakery items and dairy products may have tremendous effects on a child's health. Such as cream-filled foods, cereal, cream sauces causes increased salivation, abdominal cramp, vomiting and prostration. Improperly processed milk and canned meat may cause food poisoning and abdominal pain.

Other Effects of Food Adulteration on Community Health

- **Vegetables and fish** mixed with formalin and other type of chemicals which are used to keep the food fresh are injurious to health, that causes different types of cancers, asthma and skin diseases.

- **Unhygienic meat and meat products** can cause food infection usually with fever and chills. These are the immediate effect of food adulteration on public health.

- **Cobalt used during packaging mineral water** is highly injurious to health.

- **Tamarind and dates seed powder** mixed with coffee powder can cause diarrhea.

Other types of common adulteratio

1. Fraud in the primary materials used in food processing.
2. Change the expiration date or date of production.
3. Refilling and packaging the damaged materials .
4. Use of well-known and certified trademark illegal and irregular.
5. Manipulation or fraud of real weights and sizes of food product.
6. Change the country of origin or the producer.

Reasons for food adulteration are

- To earn more profits
- To increase the weight, adulterant is added.
- To increase volume of trade by showing lower prices.
- When supply is less than demand
- To cut down the product costs to meet the market competition.
- Shortage of authentic ingredients at affordable prices.
- Shortage of qualified personnel and no updation of processing techniques.
- Inadequate knowledge on the consequences and associated food safety risks.
- Lack of awareness and updation of the information on the adulteration related food safety outbreaks.

Reasons for food adulteration are

- Adulteration in general is done to increase commercial attribute/ characteristic of the products.

- Sometimes Adulteration, even though not hazardous may lead. to severe contamination issues, e.g. spraying of water on dry chilies to cope with the excess weight loss may lead to Aflatoxins

- Blending is not Adulteration, unless origin of the product is To origin of the product is significant

Food Adulteration – Control Approach

Statutory and regulatory authorities:

- Now to save ourselves and our descendants, we have to fight all together against these ill trends of adulteration. Government should also take serious action with tougher law against those culprits.

- We all should make aware the general people about the serious health impact of taking adulterated food. Such sincere community resistance can alter the scenario and we need to do it right now. Take care of your food means taking care of your health.

- ~~Stipulating the pra~~ctically feasible rules, requirements and regulations on the adulterants and updating them at regular intervals.

- Stringent monitoring of the implementation.

- Regular interactions with the industry to understand their concerns.

Food Adulteration - Control Approach

Industry:

- To feel more ethical and moral responsibility as food business operator to supply & serve whole some food to the society.

- Regular updates on the process and allergen related outbreaks in the world.

- Risk assessment *[probability or severity] for all the ingredients, additives* , ~~process~~ing aids and processing techniques.

- Frequent testing of vulnerable ingredients, additives and processing aids.

Food Adulteration – Control Approach

Scientific Community:

- To develop validated simple, quick and authentic test procedures to scan the ingredients, additives & processing aids for positive clearance.

- To share the knowledge with the statutory bodies and industry.

Food Adulteration – Control Approach

Consumers/and users:

- Proper understanding of the adulteration issues.
- To know difference between the natural and aesthetic attributes [texture, appearance & taste] of foods and accepting the natural ones to the extent possible.
- It is better to avoid adulterated cool drinks , instead you can have any fresh fruit juice and tender coconut.

Food Adulteration - Control Approach

- Parents should be concerned about the quality and freshness of these food articles like chocolates, sweets that children usually like.

- Take the help of food adulteration testing centres. Lodge complaints to the concerned authorities, if adulteration is detected.

- Make sure that food packets carry **certification mark** for industrial products, or labels before buying.

- Do not buy food articles, if expiry date is crossed.

Food Additives

- **Food additives are chemical substances added to processed foods:**

- To enhance/retain quality attributes such as texture, physical properties, taste, flavour etc
- To control the spoilage and enhance shelf life of the processed foods.

- All additives are not adulterants, if present within the specific limits and once exceeded the limits they become significant adulterants and can cause serious health hazards to the consumers.

- All additives are not adulterants until reported outbreak of food safety issues occur.

General Food Additives are:

- Antioxidants
- Emulsifiers/stabilizers
- Acid regulator
- Anti caking agents
- Flavor enhancers
- Artificial sweeteners

HEALTH HAZARDS OF FOOD ADDITIVES

The effects of food additives can be immediate or long-term.

1. Immediate effects of food additives

- Common reactions are urticaria, runny nose, headache, asthma,
- Cause gastro-intestinal disturbances like diarrhea, infections
- Bleeding, hyperactivity, irritability, contact dermatitis and skin eruptions.
- Toxicity due to toxic sweeteners, additives, colours etc.
- Epidemic dropsy due to consumption of Argemone oil mixed mustard oil.

HEALTH HAZARDS OF ADDITIVES

2. Long-term effects of food additives

- Damage too organs, birth defects and cancer.
- Breaking of teeth and adverse effect on the lining of the digestive tract
- Anemia.
- Cardiac arrest and stomach or intestinal cancer.
- Various abnormalities of bone, eyes, skin and lungs.
- Lathrysim due to consumption of Kesaridal (a tropical disease marked by tremors, muscular weakness, and paraplegia.

Detection of food adulteration

- **Tea powder:** Adulterants : Iron filings: Spread the tea leaves on a paper. Draw a magnet over it. The iron filings if present, are attracted by the magnet.

- **Rice and wheat:** Adulterants : Sand, grit, marble pieces, soap stone pieces. These are visually detected and removed by sorting, handpicking and washing.

- **Common Salt:** Adulterants- sand and gri t A tea spoon of salt is added to a glass tumbler containing wate r. Salt dissolves. Sand and grit settle at the bottom.

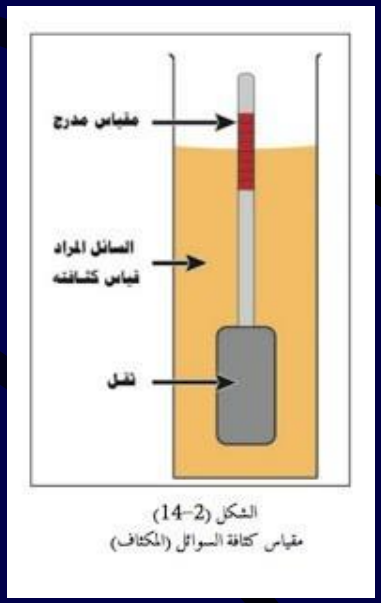
- **Coffee powder:** Adulterant- Tamarind seed powder: Two teaspoons of coffee powder is added to water in a tumbler. Coffee powder floats and the adulterants sink.

- **Cooking oil:** Adulterant- Argemone oil: About 5 ml of cooking oil is taken in a test tube and 5 ml of concentrated nitric acid is ~~added to~~ it. A reddish brown colour appears if argemone oil is present in it.

Detection of food adulteration

Milk: adulterant-Water:

An instrument called lactometer is used to measure the density of milk. Unadulterated milk should give a reading of 1.026 in the ~~lactome~~ter.



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- **Ghee and butter :** Adulterants- Vanaspathi: A tea spoon full of butter or ghee is taken in a test tube. Concentrated hydrochloric acid and a pinch of sugar is added to it. It is stirred well and allowed to settle for five minutes. Crimson red colour appears in the lower layer if vanaspathi is present in the sample.

- **Meat , poultry and fish:** Adulterants- Organolyptic tests**:**
  Appearance
- Color
- Taste ,Odor and Flavor .
- Juiciness.
- Texture and Tenderness.


THANK YOU