

# Food Adulteration Awareness : A Powerful Weapon to Combat the Food Quality Contamination

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## ABSTRACT

In India, food contamination has become a serious problem now-a-days. Consumer education and awareness is considered as the need of the hour. Adulteration like corruption has become rampant with alarming rate. The government knows that most of the spices, dal, ghee, milk sugar, tea etc are adulterated. The nature of contaminants is often impure, unhygienic, harmful, and detrimental to public health like adding the urea to milk, duplicate products often sold for the products of reputed brand, cold drinks like Pepsi, Coca cola etc and unhygienic substances, dal with stone bits, tea garnished by saw dust, turmeric mixed with chromate powder, chilly powder mixed with red colour and even fruits vegetables and cereals sold in market often having high level of toxic metals like lead, nickel, cadmium etc.

Adulteration of food stuffs is commonly practised in India by traders due to consumers' behaviour. They want to buy the food stuffs at lower price as possible as lower. The sellers now try to meet the needs of the buyers and their purchasing habit/tendency. This tendency of purchasing the stuffs motivates the sellers and traders to sell the adulterated food stuffs in the markets. Despite of ISI or Agmark certification mandatory for all edible items and food adulteration laws, food contamination has been rising at alarming rate especially in India. To encounter this ticklish situation, consumer awareness may play a vital role to combat the prevailing adulteration from a right perspective with the help of mass media and educational activities in school or colleges.

**Keywords :** Chromate Powder, Food Adulteration, Lead, Nickel, Cadmium, Weapon

## I. INTRODUCTION

Food adulteration in the developing countries like India is a quite common and is getting deadlier day by day. It not only decreases the quality of food items, but also results in number of harmful effects on human health. It is the process of adding or mixing of harmful, inferior, sub-standard, unwanted substances to food, with similar appearance or colour for increasing the quantity of food items and making more profit/gain. It may spoil the quality of food stuff by the omission of some valuable constituents. So, the spoiling of actual quality of food stuffs and the

removal of some vital and valuable constituents of food stuffs is known as food adulteration.

Indian kitchens has always been using a variety of ingredients in every day's cooking since the starting of civilization, but due to food adulteration problem in recent years, purity of these ingredients has become a matter of high concern ie a burning national health issue. In true sense, food adulteration in India starts from the agriculture fields where the overdose of fertilizers and pesticides are often used by the farmers. It often generates a problem of high level of pesticide residues across the all range of food. Most

of key products available in the market are adulterated like water in milk, vanspati in ghee, chalk powder in flour, chicory in coffee, papaya seeds in pepper, brick powder in chilli powder and wood powder in turmeric, dhaniya etc.

Along with it, colouring agents in spices are also generating severe problem; making the fruits ripen faster by the use of carbide has created a number of fatal health hazards. Surveys suggest that 25 to 30 per cent of food items in India are intentionally adulterated today food adulteration is a menace, which we all face on regular basis in the form of acute and chronic disease. 70% of young people death is supposed to be due to food borne origin.

### Objectives of the Study

1. To highlight the concept of food adulteration
2. To classify the adulterants
3. To mention the causes of food contamination
4. To highlight the diseases borne by adulteration
5. To pinpoint the detecting and testing process
6. To mention the food adulteration laws
7. To highlight the role of mass media and schools' programmes

### The Concept of Food Adulteration

An adulteration is a chemical substance which should not be contained within other substances eg food items and beverages, while deliberate addition of toxic adulterants to food products is considered as the poisoning for human consumption ie the food's original nature is substituted wholly or partially by adding or subtracting of any valuable substance to or from the food. This results in affecting the natural consumption and quality of food adversely.

### Criteria of Food Adulteration

- (a) Addition of inferior or harmful chemical substances
- (b) Removal, Abstracting or omission of vital nutrients/constituents
- (c) Imitation or copy of the original food substance
- (d) Adding the colours to enhance the appearance of food items

### Types of Adulterants

Any material which is employed for making the food unsafe or sub-standard accidentally and intentionally is called food adulterant.

- (a) Intentional Adulterant ( for financial gain)- water, sand, chalk powder etc
- (b) Unintentional Adulterant- due to ignorance, carelessness, lack of facilities for maintaining the food quality
- (c) Incidental Adulterant- Spill over effect from pesticide and fertilizers, inappropriate food handling and packing method ie it happens during the period of growth, harvesting, storage, processing, transportation and distribution of food.
- (d) Metallic Adulteration- lead in water, mercury in effluents etc

### The Causes of Food Contamination

Now-a-days, dishonest traders, importers, manufacturers, cultivators and even processing agencies are involved in such unethical practices ie food adulteration due to the following reasons:

- (a) Dishonest traders, businessman etc are involved in such adulteration practices due to more profit motive. They often show it as their business strategy.
- (b) To meet the increasing demand of public, traders often increase the quantity of food production by

mixing with sub-standard quality eg chalk powder in flour, vanspati in ghee etc.

- (c) Illiterate consumers are not aware about their health hazards caused by food contamination. They are tempted to buy the cheaper food items. Most probably, they are likely to buy adulterated food.
- (d) Lack of central and state government's initiatives towards the implications of food laws effectively. Even the health practitioners advise government to make the public aware about adulterated foods and their grave effects on health.
- (e) Scarcity of testing facilities with agencies and lack of instruments and skilled manpower in laboratories
- (f) Lack of public awareness towards paying attention on incorrection information on food packages, sales of the expired date products on shop etc.

### **The Diseases Borne By Adulteration**

As per the general information regarding food risk published by WHO(2009), toxic levels as well as nutritional imbalances are suspected to be in causing cancer, cardiovascular imbalance, reproductive

disorders, birth defects, sensory system development, mental health problem, urogenital diseases, old age dementia and learning disabilities. Therefore, the protection of diet from these hazardous conditions is essential to protect public health. The Daily Star(28 July, 2011 ) reported that the consumption of adulterated food items may cause asthma, sore throat, larynx constriction, bronchitis, skin infection, allergic reaction, diarrhoea, haematuria, circulatory failure, numbness, dizziness, kidney failure, stomach cancer, liver cancer, nervous disorders and many other diseases. Khan, M.A. (2014) reported that the long term effects are also very severe especially the incidence of renal failure, liver damage and cancer which are increasing alarming in Bangladesh. Heavy metals, such as lead, chromium and arsenic accumulate in body that might cause kidney and liver damage and develop abnormality among children. Singuluri and Sukumaran(2014) reported that in a country such as India where milk and milk products play an important role in different foodstuffs, this analysis carried out should bring about more awareness to the general public about the malpractices or negligence in milk production.

### **Bitter Truth: Slow Poisoning via Food Adulteration**

#### **Cancer**

- Metanil yellow in Dal
- Mineral oil if added to edible oil
- Chemical milk

#### **Brain Damage, Paralysis and Death**

- Mercury contaminated fish

#### **Anaemia, Paralysis, Brain Damage and Abortion**

- Lead Chromate added to turmic powder

#### **Foot drop, Insomnia, Constipation, Anaemia and Mental Retardation**

- Lead added to water and processed food

**Vomiting and Diarrhoea**

- Copper , tin and zinc

**Cardiac Damage**

- Cobalt added to water and liquors

**Allergies, Hyperactivity, Liver damage, Infertility, Anaemia, Cancer and Birth defects**

- Non permitted colours to food

Food Article	Adulterant	Harmful effects
Bengal Gram Dhal and Thoor Dha	Kesai Dhal	Lathyrism cancer
Tea	Used tea leaves processed and coloured	Liver disorder
Coffee powder	Tamarind seed, date seed powder, chicory powder	Diarrhoea, stomach disorder, giddiness and joint pain
Milk	Unhygienic water and starch	Stomach disorder
Khoa	Starch and less fat content	Less nutritive value
Wheat and other food grains(Bajra)	Ergot(a fungus containing poisonous substance)	poisonous
Sugar	Chalk powder	Stomach disorder
Black powder	Papaya seeds and light berrys	Stomach, liver problems
Mustard powder	Argemone seeds	Epidemic dropsy and glaucoma
Asafoetida	Foreign resins galbanum, colophony resin	Dysentery
Turmeric powder	Yellow aniline dyes, non-permitted colourants like metanil yellow, tapioca starch	Carcinogenic and stomach disorders
Chilli powder	Brick powder, saw dust, artificial colours	Stomach problems, cancer
Sweets, juice, jam	Non-permitted coaltar dye (metanil yelow)	Metanil yellow is toxic and carcinogenic
Jaggery	Washing soda, chalk powder	Vomiting diarrhoea
Pulse(green peas and dhal)	Coaltar dye	Stomach pain, ulcer
Suapari	Colour and saccharin	cancer
Honey	Molasses sugar( sugar plus water)	Stomach disorder
Carbonator water beverage	Aluminium leaves	Stomach disorder
Cloves	Cloves from volatile oil has been extracted	Cheating, waste of money

Source: [www.fnbnews/top-news/effects of food adulteration on human health](http://www.fnbnews/top-news/effects-of-food-adulteration-on-human-health)

**Detecting and Testing Techniques**

In the recent years, the purity of consumable items has become a matter of high concern due to multiple news reports of adulteration in commonly consumed

items. There are some common techniques to detect the adulterants in the dish, spices etc:

**(A) Turmeric Powder**

*Common Adulterants-* Metanil yellow, lead chromate, chalk powder

***Detecting Metanil yellow in turmeric powder***

Take a transparent glass with 20 ml of luke warm water and put into it a spoonful turmeric powder. Now, add a few drops of hydrochloric acid or any commonly available acid at home. Then, next shake it vigorously. If the appearance of water turns into pink colour, violet or purple; it indicates the presence of metanil yellow.

***Detecting Lead chromate in turmeric powder***

First, dissolve the turmeric powder in 1:7 sulphuric acid and filter. Then, add 1 or 2 drops of .1% of diphenl carbazide. A violet colour indicates the presence of lead chromate in the mixture.

***Detecting Chalk powder in turmeric powder***

First, take some turmeric powder in test tube and add some water into it, then few drops of hydrochloric acid to be added to find the presence of chalk powder. If the mixture gives bubbles, it means the availability of chalk powder or yellow soap stone powder.

**(B) Red Chilli Powder**

*Common Adulterants-* Artificial Colour, Brick Powder, Starch

***Detecting Artificial Colour in Red Chilli Powder***

To detect the artificial colour in red chilli powder, take a teaspoonful of red chilli powder, add it to glass of plain water and then stir it. If the colour of water changes, it indicates the presence of artificial colour in red chilli powder.

***Detecting Brick Powder in Red Chilli Powder***

To test brick powder in red chilli powder, take a glass of water and add a spoonful of red chilli powder to it. If some kind of grittiness ie gritty sediments in water at the bottom of glass is felt, it pinpoints the presence of brick powder or sand in red chilli powder.

***Detecting Starch in Red Chilli Powder***

Add few drops of tincture Iodine or iodine solution to the red chilli powder. If we notice a bluish colour change, it indicates the presence of starch.

**(C) Black Pepper**

*Common Adulterant-* Papaya seeds

***Detecting Papaya seeds in Black Pepper***

Take two or three spoonful of black pepper seeds with a glass of water. Now, put these seeds into the water. Black pepper seeds usually sink down to the bottom of glass, while papaya seeds will float on the top surface of water if the glass.

**(D) Sugar**

*Common Adulterant- Chalk Powder*

***Detecting Chalk Powder in Sugar***

Dissolve a little amount of sugar sample ie 10 gm in a glass of water and stir it properly. If the solution turns white and residue settles down at the bottom of test tube. It indicates the presence of chalk powder, while a clear solution is the indication of sugar purity.

**(E) Milk**

*Common Adulterants-* Water, Starch, Urea, Detergent

***Detecting Water in Milk***

Presence of water in milk sample can easily be detected by putting a milk drop on a polished slanting surface. If it flows slowly leaving a white trail behind it, it indicates pure milk, whereas milk adulterated with water will flow immediately without leaving a white trail mark.

***Detecting Starch in Milk***

Add a few drop of iodine solution. A blue coloured solution indicates the presence of starch.

***Detecting Urea in Milk***

First, take a teaspoon of milk sample in a test tube. Add ½ teaspoon of soybean or arhar powder. Then, mix it up thoroughly by shaking the test tube. After 5 or 6 minutes, dip a red litmus paper in the solution. Remove it after 30 seconds, if there is a change in colour from red to blue indicates the presence of urea in the milk sample.

***Detecting Detergent in Milk***

Shake 5-10ml of milk sample with equal quantity of water vigorously, milk adulterated with detergent will form a dense lather, a dense lather indicates the presence of detergent, while pure milk will have thin layer of foam.

## **(F) Ghee/Butter**

*Common Adulterants-* Vanaspati oil , Starch

### ***Detecting Vanaspati oil in Ghee/Butter***

Take a teaspoonful of melted ghee/butter sample with equal quantity of concentrated hydrochloric acid in a stoppered test tube. Add a pinch of sugar, shake it vigorously. Leave it for 5 minutes in the stand position; the appearance of red colour at the bottom of test tube indicates the presence of vegetable oil in the sample.

### ***Detecting Starch in Ghee/ Butter***

Add a few drops of iodine to two spoons of melted ghee. Appearance of purple colour is the indication of starch (like mashed potato) adulteration in the taken sample of ghee.

## **(G) Mustard Oil**

*Common Adulterant-* Argemone oil

### ***Detecting Argemone oil in Mustard Oil***

Add a few drops of nitric acid to a small amount of mustard oil in a transparent glass. Next, shake it vigorously and heat the mixture for 2-3 minutes. The appearance of red colour is the indication of the presence of argemone oil in the taken sample.

## **(H) Honey**

*Common Adulterants-* Glucose/Sugar Syrup

### ***Detecting Glucose/Sugar Syrup in Honey***

Take a glass of water and add a spoonful of honey into it. If the honey disperses instantly, it means the presence of sugar syrup/glucose. Nature of pure honey is denser and will sink to the bottom instead of dissolving instantly.

Another test- take a cotton wick dipped in pure honey, light it with a match stick, its burning shows the purity of honey. If honey adulterated with water, the presences of water will not allow the honey to burn; if it allows, it will produce a cracking sound.

## **Food Adulteration Laws**

At present, the concurrent list (III) of the Indian constitution encompasses adulteration in food stuffs and other goods. Ministry of Health and family welfare is completely responsible for controlling food adulteration and providing safe quality to consumers. Ministry of food has time to time been stipulating a number of laws to fight adulteration and to stop malpractices. Government of India enacted the following acts to protect the consumers' interest –

- (a) The Prevention of Food Adulteration Act, 1954
- (b) The Fruit Product Orders, 1955
- (c) The Vegetable Oil Product (control) order, 1947
- (d) The Edible Oil Packaging (Regulation) Order, 1948
- (e) The Edible Flour(control) Order, 1967
- (f) The Insecticide Act, 1968 and Insecticide Rules,1971
- (g) The Meat Food Products Order, 1973
- (h) The Milk and Milk Products Order 1992
- (i) The food Safety and Standards(FSS)Act by FSSAI, 2006
- (j) Consumer Protection Bill, 2018

The protection of the food adulteration act came into existence 1954and was amended in 1986 to empower the consumer and to make punishment more stringent. Recently, Government is planning to harsher punishment. The FSSAI has issued the draft amendments to food safety and standard act, 2006. FSSAI has proposed a new section to crack down on food adulteration. For example– any person who adds an adulterant to food so as to render it injurious for human consumption with an inherent potential to cause his death or is likely to cause grievous hurt, irrespective of the fact whether it causes actual injury or not, shall be punishable for a term which shall not be less than 7 years but which may extend to imprisonment for life and also fine which shall not be less than 10 lakh.

### **Role of Mass Media and Colleges to Encounter 'Food Contamination'**

- (a) Through newspapers, TV, and magazines etc, Food Adulteration awareness can generated among common public easily and in effective manner. They can be educated about consumer protection acts.
- (b) Street plays by NSS candidates should be organised to make the people aware about food adulteration and their ill effects on health.
- (c) To motivate the college students to write essays on the theme of food adulteration to arouse the curiosity towards the existing food contamination.
- (d) In college/school, the seminar and debate over the theme of food adulteration should be organised time to time. So that, new findings of individual research can be discussed and communicated to other people in fast track manner.
- (e) Government should motivate the young researchers to find out innovative methods to tackle with food adulteration causing serious health diseases like cancer, brain damage or paralysis etc.
- (f) In parents-teacher meeting, food adulteration issues in brief can be discussed with how to detect the adulteration in food at home easily and safety measures.
- (g) To enrich the college library with books and journals over food adulteration and safety measures
- (h) With the help of college management, a laboratory for detecting food adulteration should be established. Government should provide grants for such works.
- (i) At least, one chapter should be incorporated in college syllabus. It will definitely inculcate the food adulteration awareness into children right from their young age.

### **II. CONCLUSION**

To be precise, it would be worth mentioning that food adulteration like corruption has become rampant. Now-a-day, it is a very serious anti-social act as it affects the lives of thousand people every day. For encountering with it, there should be co-ordination among various government bodies and scrutinising the qualities of food products along with the increase in the awareness on the part of citizens. So, instilling the accountability into concerned people like –food inspector, drug inspector, police officials, food analysts and other people involved eg traders, sellers etc. school can instil the awareness about food contamination among common public with the help of students.

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