

Food adulteration and its impact on health

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Abstract

Food adulteration is a significant health risk in both developed and developing nations. Adulterant refers to any substances that could make food unhealthy due to the presence of foreign objects. The definition term "adulterant," refers to any substances that could make food unhealthy by introducing extraneous objects. Food production uses a variety of adulterants, such as melamine, calcium carbide, argemone oil, synthetic food colors, artificial sweeteners, formalin, etc., that make food hazardous and affect human health by causing a number of serious diseases. India is expanding quickly in practically all fields in the modern era of globalization, but one of the most crucial issues that need more attention is food safety because food adulteration has emerged as a significant issue in our society.

This study aims to investigate the causes, health risks, and preventative methods of various types of food adulteration, including incidental, unintentional, and adulteration caused by metallic contaminants. Food is a vital component of life and is one of the fundamental needs of all living things. But there are numerous adulterants in meals today. Such adulterants have been linked to cancer, anemia, paralysis, brain damage, and gastrointestinal issues. Because of the conditions in which they are grown and harvested, spices may also be polluted. According to reports, contaminated spices can lead to deterioration and some foodborne illnesses.

Keywords: Food adulterants, health risks, and food-borne illness.

INTRODUCTION :

In India, adulteration in food products is rife, particularly in goods sold in urban-slum areas, semi-urban areas, and country regions where naive consumers are defrauded by inferior food products even after paying the appropriate retail rates currently in effect. Food is a crucial component of life and is described as any material that contains proteins, lipids, and carbs and may be consumed or ingested by both humans and other animals for nourishment (Choudhary et al., 2020). Every living thing needs food to survive, as it contains critical nutrients that support human growth and maintenance. However, as a result of the presence of numerous adulterants, food is becoming increasingly contaminated, and as a result, more people are falling ill with a variety of ailments. (Vineetha and Reddy, 2021)

In order to protect the financial interests of small-scale farmers and the disadvantaged, food safety is an issue that needs to be given top importance. Private agricultural research in underdeveloped nations is glaringly unrelated to the actual requirements of the underprivileged. The type of technology utilized to manufacture and process food has an impact on food safety. It can be altered through agricultural methods, genetic engineering, and post-production handling and processing.

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Public health is negatively affected by food adulteration. The growing product volume, the net profit, and the dishonesty of producers, sellers, and processors are the causes of food adulteration. Consuming tainted food puts one at risk for catastrophic diseases like cancer, diarrhea, asthma, and ulcers. And one of the major issues today is food adulteration. The primary issue with adulterated food is that it doesn't sell well since people don't trust its authenticity.

Food Adulteration

Adulteration is the process of adding, changing or removing an adulterant or other ingredient from food. Adulterants have historically been used frequently in societies where there are few legal restrictions on the quality of food produced, inadequate or nonexistent government oversight, and harmful chemicals and poisons. If they are present within the established parameters, food additives are not adulterants. When levels are exceeded, they turn into substantial adulterants and pose a serious risk to the consumer's health. Food adulteration is the practice of adding chemicals to manufactured foods.

foods in order to improve or maintain quality characteristics including texture, physical features, taste, aroma, and other characteristics; and (ii) to reduce spoilage and lengthen the shelf life of processed foods. Antioxidants, emulsifiers/stabilizers, preservatives, anti-caking agents, artificial sweeteners, bulking agents, acid regulators, leavening agents, flavor agents, and glaze agents are included in the first category of food additions.

Adulterants can have negative health effects ranging from short-term ones like nausea, vomiting, abdominal discomfort, allergies, asthma, and headaches to long-term ones like mental retardation, cardiac arrest, and cancer.

. Examples of adulteration include the 1998 contamination of mustard oil with argemone oil and the 2008 melamine contamination of imported milk and baby formula. Legumes like imported poisonous lentils sold as local lentils, veterinary medicine residues in milk, flour manufactured from rotting wheat, animal fat in baked goods, and industrial contamination in vanaspati are some of the emerging adulterants. India uses both fresh and dried ginger significantly in its cuisine. To keep insects away, ultramarine blue, a blue-colored dye, is frequently applied to dry ginger. It is an inorganic pigment that is used to whiten laundry.

Consumers' interest in the safety and traceability of food items has grown as the use of adulterants has expanded significantly in recent years.

The Prevention of Food Adulteration Act of 1954, which established the country's food safety standards, stated that a food item is adulterated if

- a. it is not of the nature, substance, or quality that the buyer has demanded or that it represents to be;
- b. it contains any substance that detracts from its quality; or c. it has been processed in a way that adversely affects its nature, substance, or quality;

c. Any inferior or less expensive substance has been completely or partially substituted for the item, or any component of the item has been completely or partially removed, affecting its quality, or the item has been processed in a way that adversely affects its nature, substance, or quality;

d. The item was prepared, packed, or kept in an unsanitary environment, causing it to become contaminated or harmful to health;

e. The article is made entirely or partially of one or more of the following:

i. The article contains any prohibited colorant or preservative, or any permitted colorant or preservative in excess of the prescribed limits

j. The quality or purity of the article falls below the prescribed standard;

k. The container of the article is composed of any poisonous or deleterious substance, which renders its contents harmful to health;

l. The article contains any poisonous or another ingredient that is harmful to health

Adulteration types

Although there are several ways to adulterate food, there are primarily two categories. There are intentional/deliberate/knowingly and unintentional/unknowingly/incidental adulterations, according to El-loly et al. (2013).

Intentional adulteration

When a food product is intentionally altered, it is referred to as intentional adulteration. It is the addition of subpar materials with qualities akin to those of the foods to which they are introduced. They are therefore challenging to find. The adulterant could be biological or physical in nature. After reducing a certain amount to boost their profit margin with chemicals like urea and melamine, it is done to increase the level of their essential nutrients. Substances like starch, flour, cane sugar, vegetable oils, water, skim milk, sand, chalk powder, molasses, stone, brick powder, ergot, chicory, and roasted are added to increase volume.

into other dietary items, such as barley powder and ground papaya seeds (El-loly et al., 2013). The number of nutrients removed and unnecessary ingredients added to food makes it the most harmful type of food adulteration since those who engage in it are business-oriented and have forgotten about the needs of others in favor of their own financial interests (Awasthi et al., 2014).

Incidental adulteration

Adulteration results from improper hygienic conditions of food and drink goods from the production site to the consumption table. Pesticide residues, rodent droppings, larvae in meals, etc. are examples of unintentional adulterants.

Mercury, lead, and arsenic can all accidentally contaminate metals. Accidental adulterants also include pests like rodents and insects that trespass on food to a great degree, produce impurities like excreta and body secretions, and degrade food through the growth of microorganisms. Pesticides, DDT, and product residues are the most typical unintentional adulterants (Pandit et al., 2002).

D.D.T. has a 3 ppm maximum allowable level.

Various food items and their adulterants

Almost every food product, including grains, vegetables, milk, and fruits, is contaminated in some way. Because farm stairs are not well cleaned, certain adulterants infiltrate through them. These are obvious adulterants, including, but not limited to, stones, leaves, soil, sand, and dust. They are less dangerous because the consumer can clean them. Other adulterants that are put on purpose are either invisible or are effectively concealed by the color or texture. In general, they are unhealthy, and most of them cause serious illnesses like cancer. About 90% of unbranded loose forms are contaminated, including animal feed like cake used as a protein supplement for breastfeeding animals. 2012 (Alauddin).

Food Products	Food Adulterants	Impact on Health
Milk	Water, starch, urea, extraction of fat	Digestive system disorder
Sugar	Chalk Powder	Stomach infections
Tea	Artificial pigments/dye, iron fillings	Liver disorders, cancer
Coffee powder	Tamarind and date seed powder, saw dust	Diarrhea
Turmeric	Lead chromate, saw dust, metanil yellow	Carcinogenic
Honey	Fructose syrup/cane sugar	Stomach disorder
Rice, wheat	Mud grits, soapstonesbits, sand, Ergot	Cancer, genetic mutations harm the human reproductive system
Sea food	Mercury, Arsenic	Stomach and brain disorder
Ice creams	Detergent powders	Skin and lung disease
Ghee	Ghee essence, vanaspati, sweet potato, mashed potato and starch	Cancer, acute renal failure
Carbonic drinks	Aluminium leaves	Asthma, lung disorder
Green chillies/green peas	Malachite green	Cancer
Chilli powder	Artificial colors, brick powder, sudan dye	Blood and lung cancer
Mustard seed	Seeds of prickly poppy argemone	Epedemic dropsy, glaucoma
Black pepper	Dried papaya seeds	Cardiac arrest, injurious to health
Pulses	Kesari dal, metanil yellow, clay, stone	Lathyrism, carcinogenesis, stomach disorders
Butter	Margarine, starch	Food poisoning
Vegetable oil	Argemone mineral oil	Heart disease, skin infection and cancer
Sweets juices	Coal tar dye/metanil yellow	Cancer, toxin released

A list of some of the food products being adulterated by food adulterants and their harmful

Source: Adapted from Bansal *et al.* 2015



Effects on human health:-

Regular usage of the contaminated dietary substances may result in symptoms including headache, gastrointestinal problems, muscular pain, sleepiness, etc (Ram et al. 1993). For instance, the argemone oil used to adulterate ghee and butter is extremely dangerous since it induces dropsy, a disease characterized by the presence of fluid accumulating in certain bodily areas (Sharma et al., 1992). Dropsy interferes with the body's natural processes and can cause digestive issues with routine usage of washing soda-adulterated foods such as powdered sugar and other foods (Thakur et al., 2009) [11, 19]. Food adulteration is extremely sensitive to human health. According to (Anita and Neetu 2013) [25], the dangerous effects of food adulteration include diarrhea, abdominal pain, nausea, vomiting, eyesight problems, headaches, cancer, anemia insomnia, muscular paralysis, and brain damage, as well as stomach disorders, giddiness, joint pain, liver disorders, dropsy, gastrointestinal problems, respiratory distress, edema, cardiac arrest, glaucoma carcinogenic effects, kidney failure, It has been discovered that a number of chemicals and colors used in fruits and vegetables are extremely harmful to health (Faraz et al., 2013 and Lakshmi et al. 2012).

Food Borne Illness Due to Adulteration

Humans get ill with a number of ailments as a result of eating tainted food. Vision loss, heart conditions, appendicitis, issues with the small intestine, respiratory conditions, anaemia, epilepsy, neurotoxicity, etc. are a few disorders. 2016 (Manasha and Janani) [7]. After eating tainted food, victims of different illnesses such as nausea and vomiting, diarrhoea, weakness, fever, cancer, goitre, paralysis, etc. became ill. Singh, Walia, and Thakur (2009) [11, 19]. ailments including acute glaucoma, gastritis, teeth mottling, typhoid, food poisoning, dysentery, botulism, liver damage, etc. that are brought on by eating food that has been tampered with. (2013) Rasul et al.

According to Faraz et al. (2013), food adulteration leads to a variety of food-borne illnesses, including giddiness, stomach problems, nausea, vomiting, eye problems, sleeplessness, muscular paralysis, brain damage, edema, cardiac arrest, kidney failure, and digestive system issues. Food poisoning is the medical term for illnesses that are transmitted through contaminated food, such as intoxications and infections. Food-borne illnesses are brought by by-product flaws, adulteration, deceptive advertising, and low-quality goods (Excelce, 2015). In its broadest definition, the term "food poisoning" refers to any illness brought on by ingesting food that contains bacterial or non-bacterial components. The most common signs of food-borne illnesses include headache, elation, nausea, diarrhea, slow heartbeat, rigors, cramps, etc (Anant, and Bhagat, 2018).

Food poisoning is a problem that affects both the formal and informal sectors of the food industry globally. Microorganisms that are present in food have a significant impact on the relationship between diet and health in two different ways. In fact, despite the implementation of stringent laws, regulations, and new technology to guarantee the safety and quality of food, food pathogens continue to infect people and spread disease (Siciliano and Mazzeo, 2019) . Millions of people worldwide get food-borne illnesses every year as a result of eating tainted food, making it one of the most significant global public health issues.

Due to the consumption of foods produced in unclean conditions, a lack of hygiene education, a drought, contaminated water, incorrect food storage, etc., people in many nations are suffering from food-borne diseases. In both industrialized and developing countries, food-borne illnesses are a sign of the growth of public health issues.

Nevertheless, these problems have a significant influence on the economies and health of developing nations. Inappropriate food storage, contaminated utensils, a lack of good hygiene standards, and improper cooking techniques are just a few of the factors that are frequently linked to the epidemic of food-borne illnesses. (2017) Miri et al.

Food poisoning, also known as a food-borne sickness, is an abdominal ailment brought on by consuming tainted food, such as food that has been improperly prepared, cooked at the wrong temperature, or as a result of inadequate hygiene. This contamination may contain parasites, poisons, bacteria, or viruses. The degree of severity of food poisoning depends on the cause and can range from moderate to severe, even life-threatening illnesses (Prashanth and Indranil, 2016).

Conclusion

Without our understanding, food adulteration can have a significant negative impact on our health. A few proactive efforts from our culture can stop it. The rise in food prices needs to be monitored by the government. The consumer should refrain from purchasing food from establishments that do not maintain proper hygienic standards. Government organisations should inspect both regional and national food retailers.

We can ensure that future generations have a healthy and secure future if we actively participate in these developments. The main objectives must be to safeguard both the consumer's rights and health. In addition to this, the food business faces difficult challenges every day such as combating food fraud or improper practices. In order to reduce the risk of food adulteration, both the food business and the manufacturer must participate.

Additionally, it is essential that every consumer is always informed when choosing food items since only by doing so can we protect our health from various forms of adulterants that are present in food goods and have a negative impact on human health. Therefore, it is important to educate every customer about the dangers of consuming such food products. Food adulteration is a serious problem because it directly impacts people's health.

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