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FOOD ADULTERANTS AND THEIR IMPACT ON HUMAN HEALTH: A REVIEW

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Abstract

In both the developed and least developed countries, the food adulteration is a major harmful cause. The term "adulterant" was defined as, any substance which could force the food unsafe for containing foreign matter. The use of different adulterants like melamine, calcium carbide, argemone oil, synthetic food colors, artificial sweeteners, formalin etc which is found in food products turns the food poisonous that harms human health and are the cause of various serious diseases.

Keywords: Food adulterants, additives, health hazards, food borne illness, consumer awareness, remedial measures.

Introduction

Food is very important aspect for life, and it is defined as any substance which is composed of carbohydrates, water, fats and proteins which can be eaten or drunk by humans as well as animals for their nutrition (Choudhary et al., 2020).

For every living being, food is an essential need which provides vital nutritive components and it helps in the growth and maintenance of human being. But day by day, due to the presence of various adulterant, food is getting adulterated, and the people become the victim of various diseases (Reddy and Vineetha, 2021).

According to Kharadi (2021) For the maintenance of proper health, food gives us major nutrition and plays an important role. For our life, food is one of the basic needs. But to gain profit illegally and earn money by cheating the consumers, many people malconduct the practice of adulteration of food products.

Adulterants

According to Nagvanshi (2015), The substances which are present in the food and are hazardous to the human health are called as adulterant, in another word, those substance which degrades the quality of food is called as adulterant. The adulterants are found in all the food stuffs viz. milk and milk products, vegetables, oils and fats, spices and condiments, beverages like coffee, tea etc, these are adulterated by various ways. In their daily life these food stuffs are used by every human in the form of food. Adulterants which are present in food stuffs not only lowers the nutritional quality of food stuffs but if we use such adulterated food stuffs for eating purpose daily, then it affects our health very severely.

According to Churi (2021), An adulterant is a substance which is found in various other substances like food, cosmetics, pharmaceuticals, fuels or many other chemicals that conduct the effectiveness of these substances. In any food products, usually the adulterants are added to increase its volume, weight etc for either decrease its costing.

The adulterants are those poisonous substances, which are added into the food products then the food becomes adulterated, and which may make it harmful to human being (Manasha and Janani, 2016).

The adulterants are those chemical substances which should not be added into the food for legitimate or other health issues. By which the food becomes impure and unsafe for consumption (Mishra, 2016).

Food Safety and Standard Act of India (FSSAI) defined adulterant as, "any material which could be employed for making the food impure, unsafe or sub- standard or misbranded or containing extraneous matter". The adulterants are that substances which are added or removed from the food products and affects the natural composition and nutritional quality of food products or the substances that is used to reduce the quality of food products is known as adulterants. These adulterants are added in our daily used food products and are harmful for health and it can also cause cancer and some hazardous effect too (Jaiswal et al., 2016).

Food adulterants resulting from food manufacturing and processing can also cause adverse effect on human health. These causes various types of diseases like cancer, cardiovascular diseases, kidney and liver disfunction, hormonal imbalance, reproductive disorders, immune system suppression, mental health problems etc. There are several chemicals which are used as an adulterant like formalin, calcium carbide, melamine, histamine etc. which can cause adverse effect on human health (Mridha, 2011).

Food adulterant is defined as those adulterants and substances which are not done only unintentionally by consumers but also turned food non- consumable or sub- standard and also may cause adverse health effects extending from acute symptoms such as abdominal pain, vomiting, asthma, headache, mental retardation, cardiac arrest and chronic effects such as cancer (Oti, 2021).

Food Additives

WHO defined, food additives as a substance which are added to the food products for the purpose of maintaining or improving its safety, taste, freshness, appearance. Most of the peoples are not concern about these chemicals. There are many additives are found which are added into food products like preservatives, food colors, food flavors, flavor enhancers, high intensity, low calorie, sweeteners, anti- oxidants, emulsifiers, acidulants, anti-caking agents. Except additives, pesticides, insecticides, fertilizers and many more are also putting indirectly hazardous impact on human body (Negi et al., 2021).

Food additives are substances that are added into the food to improve its appearance, flavor, color, texture and prolong shelf-life. All food additives are given labelling codes, commonly known as "E-number". Food additives are restrained to outrageous scientific safety assessment, former to their approval to render no harmful health effects on consumers. The use of an improper quantity may be harmful to the food or to the consumers. These additives can cause various health hazards on different areas of human health like allergies, hyperactivity in children and decrease in human immune response etc (Gherezgihier et al., 2017).

The people consumed those food products which are characterized by attractive color, special flavor, long preservative and with a high calorie. These characteristics are present in only those food products that contain chemical components. These chemical components are named as additives. There are some more food products are found which contain very dangerous food additives such as chewing gums and sweets which contain high amount of two different types of additives viz., aspartame(E951) and tartrazine (E102). Both causes harmful effects on human health (Rhaiem et al., 2016).

Food additive have been used from centuries to increase the appearance and flavor of food and their shelf life. Food additives are such type of chemicals when they are added to foods then they keep them fresh or to increase their color, flavor, or texture. Additives maintains consistency and nutritional value of the food products. Some of the additives can cause harmful impact to the human body. Out of which some are carcinogenic in nature. The intake of food additive in excess amount for a longer period also cause harmful

effect on health and causes various diseases and side effects like allergy, cancer, brain damage, hyperactivity etc (Baig and Kasim, 2018).

In the food industries the food additives are widely used to enhance the shelf life of food products and increase the characteristics of particular foods, which are often lost during processing. The sodium salt is an additive which is commonly used as a chemical preservative in foods and mainly it is found in beverages industries (Linke, Thais and Ligia, 2018).

Food additives are those substances which are either naturally originated or man -made, which are added to foods to give out a definite technological or sensible function. Food additives are any substances which are used in many ways either it is normally consumed as a food by itself or not used as a complicated ingredient of the food or it has no nutritive value (Abdel Ghany, 2015).

Food additives are those organic substances which are intentionally added to food in small amount during production or processing to improve the color, texture, flavor, appearance and taste of the food. Food preservative is one of the classes of food additive which helps to prevent food spoilage by preventing the growth and spreading of different varieties of pathogenic microorganisms (Inetianbor, Yakubu and Ezeonu, 2015).

Food additives are the substances other than essential food products, which are present in the foods as reagent of any aspects of production, processing, storage, packaging etc. There are various types of food additives are present which is found in food products like sugar, salts, acids, spices etc (Rawat, 2015).

Food products their adulterants and health hazards on human health

According to Sasi Rekha and Paul (2018),

In oils and fats, argemone oil is found as an adulterant which causes various diseases on human health like epidemic dropsy, glaucoma, blindness, cardiopulmonary arrest. Pesticidal residue is an adulterant which is found in most of the varieties of food products. It causes various diseases like acute or chronic, poisoning with damage to nerves and vital organs. Mineral oil is an adulterant which is found in oils and black pepper. It causes diarrhea, vomiting, cancer etc. Methyl alcohol is an adulterant, found in alcoholic liquors, causes blurred vision, blindness, death. Lead chromate is found in turmeric and powder mixed spices within all type of adulterant and causes anemia, brain damage etc. Metanil yellow is an adulterant which is found in turmeric, collective form of spices, saffron, pulses without husk, rice, beverages and causes tumors, cancer, testicular degeneration in males etc. Kesari dal is an adulterant which is found in pulses and besan, causes paralysis of legs. Dung is an adulterant which is found in coriander leaves and causes tetanus. In suji, tea leaves, iron filling is found as an adulterant and causes possibility of tetanus.

According to Gawali (2021),

Water may be an adulterant which is commonly found in milk and decreases the nutritional value of milk which is a serious concern for human health. In milk and milk powder, melamine is found as an adulterant which cause renal and urinary problem and even newly born death. Urea is an adulterant which is found in milk and causes hazardous effect on human being like acidity, indigestion, ulcers, and cancers. It is also harmful to heart, liver, and kidneys. Detergents are the adulterants which are added into milk to emulsify and gives frothy solution and the characteristic white color of milk and causes gastro- intestinal diseases into the humans. Hydrogen peroxide is an adulterant which are added into the milk to keep up the freshness of milk for a longer time. Starch is an adulterant which is also found in milk and causes various diseases. It causes diarrhea when undigested starch accumulates into the colon. It is very fatal for diabetic patients. Neutralizers are the adulterants which are added into the synthetic milk to neutralize the acidic effect. It causes hypertension and heart ailments. Chlorine is an adulterant which is also found in milk. It causes clogging in arteries and develop heart problem. In milk, preservatives are also used as an adulterant which causes abdominal pain, diarrhea, vomitions and other poison related symptoms. Pesticides are also an adulterant which is found in milk. It is carcinogenic in nature and causes serious health hazards.

According to Chaudhary (2019),

Vanaspati, anatta and oleomargarine are an adulterant which is found in ghee and causes acute renal failure. Water and skim milk are an adulterant which is found in milk and causes stomach disorders. In condensed milk, paneer and khoya are found as an adulterant. It also can cause stomach disorders. Starch, rice powder or wheat flour are an adulterant which is found in ice-cream. It causes various diseases which affects lungs, kidneys, and heart. In butter, the adulterants are vegetable oil, anatta, banana, oleomargarine. It causes food poisoning. In mustard oil, papaya seeds are found as an adulterant. It can cause epidemic dropsy and severe glaucoma. In black pepper, papaya seeds are found as an adulterant. It can cause severe liver problems and stomach disorders. In green chillies and peas, the adulterant is malachite green. It is extremely carcinogenic in nature. Brick powder is an adulterant which is found in chillies powder. It causes stomach disorders. In sugar, the adulterant is chalk powder. It can cause stomach disorders. In coffee, the adulterant is chicory, roasted barley powder, tamarind seeds. It causes various diseases like diarrhea, stomach disorders, giddiness, and severe joint pains. In wheat, the adulterant is ergot (poisonous fungus). It is highly poisonous and causes harmful impact on human being. In honey, the adulterant is molasses, cane sugar. It also can cause stomach disorders. Chalk powder is an adulterant which is found in jaggery. It causes vomiting and diarrhea.

Dongre et al., (2020),

In tea, foreign leaves or exhausted tea leaves are found as an adulterant. It can cause hazardous effect on health and carcinogenic in nature. In oils the TCP is found as an adulterant which causes paralysis. Sand, marble chips, stones, filth are an adulterant which is found in food grains, pulses etc. It damages digestive tract. Mineral oil, petroleum is an adulterant which is found in edible oils and fats, black pepper etc. It can cause cancer. Lead chromate is an adulterant which is found in turmeric whole and powdered, also in mixed spices. It can cause anemia, abortion, paralysis, brain damage etc. Arsenic is an adulterant which is found in fruits such as apples sprayed over with lead arsenate. It can cause dizziness, chills, cramps, paralysis, death, wrist drop etc. In drinking water, sea foods, tea etc, fluoride is found as an adulterant. Excess accumulation of fluoride causes fluorosis i.e., mottling of teeth, skeletal and neurological disorders. Pesticidal residue is an adulterant which is found in all type of food. it causes acute as well as chronic poisoning with damage to nerves and vital organs like liver, kidney etc. Oxalic acid is an adulterant which is found in spinach, amaranth etc. It causes renal calculi, cramps, failure of blood to clot.

Food borne illness

The humans affected by several diseases after the consumption of adulterated food products. Some diseases are- loss of vision, heart diseases, appendicitis, small intestine problem, respiratory diseases, anemia, epilepsy, neurotoxicity etc (Manasha and Janani, 2016).

After consumption of contaminated food, the peoples ill from various diseases like nausea, and vomiting, diarrhea, weakness, fever, cancer, goiter, paralysis etc (Thakur, Walia and Singh, 2009).

The various diseases caused after the consumption of adulterated food e.g., severe glaucoma, gastritis, teeth mottling, typhoid, food poisoning, dysentery, botulism, liver damage etc (Rasul et al., 2013).

As reported by Faraz et al., (2013**)** food adulteration causes various food borne diseases like abdominal pain, nausea, vomiting, eye sight problem, insomnia, muscular paralysis, brain damage, edema, cardiac arrest, stomach disorders, giddiness, kidney failure, digestive system disorders etc.

Food borne diseases includes intoxications and infections through consumption of contaminated food are referred as food poisoning. Defects in the product, adulteration and false advertisement and poor quality of products causes food borne diseases (Excelce, 2015).

The safety of food at the time of consumption is danger for human health and depends on various variables including checking the safety of food ingredients when choosing and purchasing food, food transportation, storage and preservation, preparation and cooking and exposure of food at high temperature and aspects of personal hygiene and the basic health care of food handlers. These are the major factors to contribute to food borne illness occurrences in the home (da MOTTA et al., 2014).

Food adulteration is global health issue. When people consumed adulterated food then they become affected by different types of food borne diseases like stomach pain, diarrhea, vomiting, nausea, headache etc (Abdalla, Suliman and Bakhiet, 2009).

Food borne diseases are the most common health problem faced worldwide and are particularly unruly in India, mainly due to a relative lack of sanitation and public hygiene. The term food poisoning in its wider sense comprises all diseases which results from ingestion of food containing non- bacterial or bacterial products. The major symptoms of food borne diseases are headache, giddiness, vomiting, diarrhea, slow pulse, rigors and cramps etc (Anant, Inchulkar and Bhagat, 2018).

In the food industry, the food poisoning is a worldwide challenge that arise from both formal and informal sector. The most pre-dominant bacteria isolated in starchy foods were Enterobacter spp., Escherichia spp., Staphylococcus spp. and Pseudomonas spp., which were found in 20, 16, 12 and 11% respectively. The most adulterated food samples were soup, stew, macaroni, salad etc (Yeleliere, Cobbina and Abubakari, 2017).

Food borne diseases minimizing the public health implications and causes economic losses. Food borne diseases caused by various pathogens, chemical contaminants and natural toxins which is remain a global public health challenge. Since day by day the new threats are continuously emerging while others are being controlled. In most of the countries, the food consumption which is prepared outside from the home increases high risk of divestment in food services (Feltes, Arisseto- Bragotto and Block, 2017).

Food borne microorganisms plays an important role in correlation between food and human health from a dual means. In fact, even the introduction of strict rules and regulations and new technologies to ensure food safety and quality, the food pathogens continue to cause infections and diseases and preventing a serious public health concern (Siciliano, Uzzau and Mazzeo, 2019).

In every year, millions of people worldwide suffer from food borne diseases and illness resulting after the consumption of contaminated food and day by day which has become one of the most worldwide public health problems. In many countries, peoples are suffering from the food borne diseases because of consumption of foods produced under unhygienic condition, lack of hygiene education, drought, contaminated waters, improper food storage etc (Sanlier, 2009).

Food borne illness are the indicatory of the spread of public health problem in both developed as well as in developing countries. Although these issues have an important impact on health and economics in developing countries. Factors commonly related with the epidemic of food borne diseases include improper food storage, contamination of tools, poor hygiene condition and improper cooking etc (Miri et al., 2017).

Food poisoning/ food borne diseases is an abominable illness which is caused by eating contaminated food. Such type of food includes poorly prepared, cooked at wrong temperature or as a result of poor hygiene. This contamination including bacteria, viruses, toxins or parasites. This is a common illness which ranges from mild to severe, even life-threatening conditions, the degree of severity of food poisoning will depend upon the cause (Prashanth and Indranil, 2016).

Consumer Awareness

Consumer awareness is about making the consumer aware of their rights. It is necessary to informed that the consumer should take all the necessary precautions in order to protect their rights. The consumer protection is only possible through consumer awareness and education. The peoples are unaware about their rights due to high level of poverty, unemployment and poor literacy levels. So, it is necessary that the Government take an action to educate the consumers and basic consumer rights must be introduced at the school level (Boro, 2018).

In Tenkasi to analyze the consumer's awareness about the food adulteration and precedency for buying practices of food products to examine the consumers, a study was carried which showed that the main reason of rising the food adulteration is the consumer's illiteracy, ignorance and lack of rights and responsibilities towards the food adulteration. It has been also concluded that there are few educated peoples have also had no awareness about food adulteration, so it is necessary that the Government should take an action and create

well developed educational program on food adulteration which led to increase the awareness about regarding food adulteration (Sundaramoorthy and Abhirami, 2016).

As we know that food adulteration is one of the major health hazards and day by day increasing in all over the world so, it should be taken care and eradicate without further delaying. It is the duty of every people to taken an active interest in unbarring and deploring them. It is necessary that to create an awareness among the consumers to buy a quality product which are taken from hygienic places by manufacturer, retailers and wholesalers (Yamuna et al., 2014).

In India the adulteration of food products is one of the most common issue. It involves both improve structure and quality of food stuffs and supply mis branded food products. The common outcomes are explosion of food borne diseases. The cause of adulteration is lack of Government laws, lack of consumer awareness. So, it is necessary to aware the consumers about the food adulteration and their harmful effect on human health after consumption of such type of adulterated food. The responsibility of every citizen to aware the consumers about food adulteration by creating different educational programs and to give him the knowledge about food safety rules and regulations. Through this awareness can easily reduce the threat of food adulteration (Srivastava et al., 2016).

Remedial Measures

The PFA act and rules must be strictly followed and culprits punished adequately. The risk of adulteration may be increases due to lack of adequate training to food inspectors and unconcern consumers. Therefore, the need for rationalization of the standards prescribed under PFA Act. The contaminated, cheaper and harmful food items should be disincentive from trade. There are certain distinctions in the standards prescribed under PFA act and ISI and agmark standards (Srinivas, 2017).

There are following measures can be applied for the adulteration of food. In the cases of adulterants are detected easily there should be a rapid, reliable and inexpensive tests are used to detect various types of harmful contaminants or adulterants. There is a regulation made for packaging and distribution of dairy products. The contaminated, mis branded and harmful food stuffs should be discouraged from trade (Kamthania et al., 2014).

It should be necessary that to take an action against the adulteration which may help to consumers to live healthy life. The best remedial measures which should be adopt by the Government are adopting BSTI standard, enforcing law and imposing punishment and social motivation of food consumers etc (Sattar et al., 2019).

Conclusion

To protect the health of the consumer along with their rights must be the primary goals. Apart from this, day by day the food industry facing the challenging issues like preventing food fraud or wrong practices. So, the food industry and constructor must take part to control the danger of food adulteration. As well as, it is necessary that every consumer should always be aware while the selection of food items just because of this we can prevent our health from different types of adulterants which is found in food products and causes harmful impact on human health. So, it is necessary to aware every consumer do not consume of such type of hazardous food products.

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