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Research Article

**IDENTIFICATION OF ADULTERANTS IN REGULAR FOOD
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Institutions, School of Pharmacy, Chowdariguda, Ghatkesar, Hyderabad, Telangana, India.**Article Received:** May 2021**Accepted:** May 2021**Published:** June 2021**Abstract:**

Food is one of the basic needs for every living being and is very important aspect for life. But now a day's foods are affected by different adulterants. Adulteration in food is often present in its most crude form as prohibited substances are either added partially or wholly substituted. Contamination or adulteration in food is added for various reasons which includes financial gain, carelessness and lack in proper hygienic condition of processing, storing, transportation and selling. Adulteration is a substance which reduces the vital importance of food. Adulterants like metanil yellow (an artificial colour) is used to intensify the colour of the turmeric powder also adulterants like chalk powder, brick powder and toxic substances are added to gain profit and to lower the cost so as to compete with the market. Such adulterants can lead to anemia, paralysis, brain damage, stomach disorders and also cancer. Spices may also be contaminated because of conditions under which they are cultivated and harvested. Contaminated spices have been reported to cause certain food-borne illnesses and spoilage. Food adulteration is the process in which the quality of food is lowered either by the addition of inferior quality material or by extraction of valuable ingredient. This study is centered to the food adulteration. The main objective of the study was to assess the knowledge on food adulteration and their effect on health among the daily life.

Key words: Food adulteration, contamination, metanil yellow, hygienic condition.

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INTRODUCTION:

Food is defined as adulterated if any valuable constituent has been substituted, if any substance has been added to increase its weight or reduce its quality or make the product appear of more value than it actually is.

Adulterated food is dangerous because it may be toxic and can affect health and it could deprive nutrients essential for proper growth and development of a human being. Food adulteration is one of the serious challenges in the Indian society. Despite various measures and penalties, the problem continues to remain a big challenge. The saddest part is those who engage in such dirty practice do not leave even infants' milk products and lifesaving medicines. Adulteration of food is a menace to the society and the perpetrators cannot be let off lightly.

Among man's everyday needs, food plays a major sustaining role. From the simple dish to the most elaborate haute cuisine, food preparation is as varied and rich as a man's taste. The lure of riches and general apathy towards mankind has led to adulterants being added to food from the simple stones in rice to the more harmful brick and boric powder.

Adulteration in food is often present in its most crude form as prohibited substances are either added partially or wholly substituted. Contamination or adulteration in food is added for various reasons which includes financial gain, carelessness and lack in proper hygienic condition of processing, storing, transportation and selling. Therefore, the consumer is either fooled or usually become victim of diseases. In backward or developing countries, such kind of adulteration is usually seen. It is essential for the consumer to be aware of common adulterants and their effect on health. Market has high number of food producers also food is imported in large amount which

permits the producer to mislead and cheat consumer. There are producers who take advantage of legal rules and others who commit food adulteration and to differentiate between the two is extremely troublesome. Adulteration in foods not only decreases our social value but morality too. The awareness of consumers plays important role in preventing food adulteration. Unawareness and unfair market behaviour might endanger consumer health and misleading can lead to poisoning. Therefore, basic screening tests should be known to common people.

The Objective of this project is to study some of the common food adulterants present in different common food stuffs. In this project different food items are tested in laboratory by some tests to detect the adulterants present. More over different samples of each food item are also taken and their quality is specially analysed. The batch no, serial no, date of expire, n date of modifications is also noted for the packeted samples of the food items. The way in which the experiments had taken are described in this paper and result for each sample has reported here.

MATERIALS AND METHODS:**Detection of adulterants:**

Detection of starch in milk: Along with water, a very common adulterant of milk is starch. Milk consists of three basic components which are water (about 80%), fat (about 3.5%) and solids containing protein, lactose and mineral matters (about 8.5%). Milk is adulterated with starch to maintain the thickness of fat extracted milk or diluted milk. The presence of starch can be detected by adding iodine solution to milk. Iodine solution or tincture of iodine is used as a reagent.

Procedure: At first 5 ml of milk sample is taken in a test tube and is boiled for 3 to 4 min. Then it is cooled and 1-2 drops of iodine solution is added to it, and shaken well.



Figure 1: Milk products

Detection of yellow dye in turmeric powder: Turmeric (Haldi) powder is a popular natural dye used in cooked food. The powder is often adulterated with rice powder, besan, wheat powder etc. which makes the colour of the turmeric pale. To make the colour bright, often lead chromate, which is a poisonous chemical or coal tar dye is added to turmeric powder.

- a) Detection of lead chromate - Reagents: Concentrated HCL and 1% diphenyl carbazide in rectified spirit. Procedure: 1g of the turmeric powder sample is taken in a test tube and 5 ml of concentrated HCL is added to it. The mixture is shaken thoroughly. Then 1ml of 1% diphenyl crabazide reagent is added. Detection: Appearance of pink to red colour indicates the presence of lead chromate ($PbCrO_4$) in the sample.
- b) Detection of coal tar dye - Reagents: Concentrated HCL and petroleum ether (40-60 °C). Procedure: 5g of the sample is taken in a test tube and 10 ml petroleum ether is added to it. The mixture is shaken vigorously and is allowed to stand. 5 ml of conc. HCL is added and is again shaken thoroughly. Detection: The aqueous acid becomes pink to red in colour if coal tar is present.



Figure 2: Haldi samples

Detection of vanaspati (vegetable) ghee in deshi ghee (milk product): Deshi ghee, which is a milk product is much costlier than vanaspati ghee. So, deshi ghee is often adulterated with vanaspati ghee. Vanaspati ghee contains sesame oil, which is not present in deshi ghee. Sesame oil reacts with the mixture of conc. HCL and furfural solution to produce rose red colour. This test is known as Baudoium test. Reagent: Concentrated HCL and 2% solution of furfural in alcohol. Procedure: 5mL of melted ghee sample is taken in a test tube. 5mL of conc. HCL is added to it. Then 2-3 drops of 2% solution of furfural are added in alcohol. The mixture was shaken and is allowed to stand for about 10 min. Detection: Appearance of rose red colour indicates the presence of vanaspati ghee in the ghee sample.



Figure 3: Ghee samples

Detection of argemone oil in mustard oil: Argemone oil is a non-edible oil which is often used to adulterate vegetable oil or fat. Argemone oil can be easily detected by $FeCl_3$ solution test. Reagent: Concentrated HCL, 10% $FeCl_3$ solution (dissolve 10g to anhydrous $FeCl_3$ in 10mL concentrated HCL and dilute to 100 ml with distilled water). Procedure: In a test tube, 5 ml of the mustard oil sample is taken and 2 ml of conc. HCL is added to it. Then it is shaken vigorously and is warmed in a little water bath for 5 minutes. It is shaken intermittently during warming. 1mL of 10% $FeCl_3$ solution is added and is mixed it by rotating the test tube between the palms. The mixture is heated in a boiling water bath for about 10 min. Detection: Reddish brown needle like crystals appear at the junction of the acid and oil, if argemone oil is present.



Figure 4: Oil samples

Detection of washing soda, chalk powder and water insoluble substance in sugar: Chalk powder is a water insoluble substance which is often used as a common adulterant in sugar. Moreover, sugar is usually contaminated with washing soda. a) Detection of various insoluble substances. Reagent: concentrated H_2SO_4 , alcoholic solution of α -naphthol, dil. HCL. Procedure: A small amount of sugar is taken in a test tube and is shaken it with little water. Pure sugar dissolves in water but insoluble impurities do not dissolve. Detection: Insoluble substances appear at the bottom of the test tube if they are present. b) Detection of chalk powder, washing soda. Reagent: dil. HCL

Procedure: To a small amount of sugar taken in a test tube, a few

drops of dil. HCl is added and observed. Detection: Brisk effervescence of CO₂ shows the presence of chalk powder or washing soda in the given sample of sugar.



Figure 5: Sugar samples

Detection of red coloured lead salts in chilli powder: Chilli powder often adulterated with red are coloured lead salts and brick powders. Reagents: dil. HNO₃, KI Procedure: To a sample of chilli powder dil. HNO₃ is added. The solution is filtered and a few drops of potassium iodide solution is added to the filtrate.

Detection: Yellow ppt indicates the presence of lead salts in chilli powder and insoluble substances indicates the presence of brick powder in the sample.

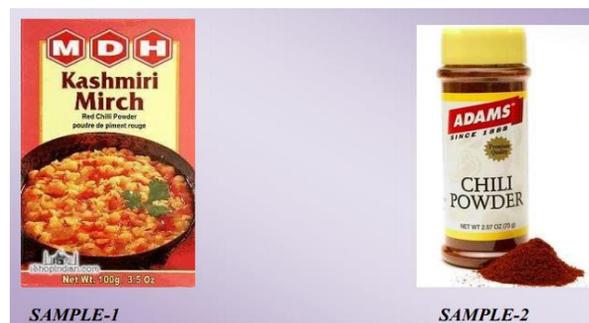


Figure 6: Chilli powder samples

Detection of Khesari dal in besan: Besan powder is usually adulterated with Khesari dal which contains butyl oxalyl alanine amine (BOAA) which causes lethargy and ultimate paralysis in lower limbs of human body on regular consumption. The detection of BOAA in besan powder indicates adulteration of it with Khesari dal. Reagents: dil. HCl Procedure: To 1g of the besan sample is taken in a test tube and 10 ml of 70% HCl is added to it. The content is boiled for some time. Detection: Development of pinkish colour indicates adulteration of basan with Khesari dal.

RESULTS AND DISCUSSION:

The results for above tests are illustrated in the following tables.

Table 1: Different samples of milk

S. No.	Samples	Batch No.	Result
1	Amul TAZA	B5087M	Adulterant absent
2	Dairy milk	----	Adulterant present
3	Nestle Everyday	127304514A	Adulterant absent
4	Amulya	4B8790	Adulterant absent

Table 2: Different samples of haldi

S. No.	Samples	Batch No.	Result
1	MDH Haldi Powder	GN-60	Adulterant absent
2	Open sample	-----	Adulterant present
3	Bharat Haldi powder	KL-29	Adulterant present

Table 3: Different samples of ghee

S. No.	Samples	Batch No.	Result
1	Amul Ghee	11N307	Adulterant present
2	Annapurna Ghee	M907B	Adulterant absent

Table 4: Different samples of oil

S. No.	Samples	Batch No.	Result
1	Dhara Mustard oil	A3K02	Adulterant absent
2	Assam valley pure mustard oil	07	Adulterant absent
3	Open sample	-----	Adulterant absent

Table 5: Different samples of sugar

S. No.	Samples	Batch No.	Result
1	Open sample	-----	Adulterant present
2	Packed sample	-----	Adulterant absent

Table 6: Different samples of chilli powder

S. No.	Samples	Batch No.	Result
1	MDH Chilli Powder	B17	Adulterant present
2	ADAMS Chilli Powder	CH07	Adulterant present

Table 7: Different samples of besan

S. No.	Samples	Batch No.	Result
1	Open sample	----	Adulterant present
2	Packed sample	956G	Adulterant present

Food adulteration is a growing menace that unscrupulous traders and manufacture all over the world indulge in to exploit gullible consumers to make quick and easy money. It is very difficult for the consumer to select one food item because of misleading advertisements, improper media emphasis and food adulteration. As a result of these malpractices, the ultimate victim is a consumer, who innocently takes adulterated foods and suffers. In all free market societies where, legal control is poor or non-existent with respect to monitoring of food quality by authorities, usage of adulterants is common and rampant. Every nation on earth has suffered cases of adulteration at one time or other. Government authorities with great efforts have succeeded in reducing the recurrent occurrences; but have not been able to eliminate it. Only an aware and an informed consumer will be able to eliminate it conclusively by continuous routine monitoring. The dictionary defines food adulteration as an act of intentionally debasing the quality of food offered for sale by either the admixture or substitution of inferior substances or by the removal of some valuable ingredient.

Within the past few decades, adulteration of food has become one amongst the intense issues. Many agencies came upon by the Government of India to get rid of adulterants from food stuff. Screening of adulterated and non-adulterated food is important for daily life to make sure that such foods don't cause any health problems.

Most of the Foods we are having are prone to food fraud and adulteration. Food adulteration is either the addition of a non-food item to increase the quantity of raw or prepared food intentionally or non-food substances added accidentally. Food adulteration also includes any poisonous or deleterious substances which may render the food injurious to health. Food adulteration can be either the act of addition, removing

valuable food component or substitution of these valuable ingredients with relatively less expensive (cheaper) substances for unfair economic gain. This act of food fraud may be an economic gain for the manufacturer, while it is loss for the final consumers of the products. While buying and serving an adulterated food, consumers are affected in different ways; they may not get the intended food nutrients, the adulterated foods may be unsafe for health and it can also be economic loss to the consumers. Detection of food adulterant is more difficult when both adulterant and the food itself have approximately the same physiochemical makeup. Adulterations of food interfere with consumers' right to get safe and good quality foods. So, all responsible individuals, organization, including government should fulfil their responsibility to protect the act of food adulteration and to expose the identified acts.

I have studied different chemical reactions involving in the process of detection of different adulterants in different food items. These experiments were performed for the purpose of detecting various adulterants present in common food. The results obtained during these experiments have been shown in this project. The experiments have been performed by common laboratory methods.

People need to be very cautious when they buy products from stores and malls. They should check for standards like ISI standard mark, Agmark for quality products, FSSAI standard mark, date of packing and date of expiry etc. If none of the prescribed standard marks is there, then they should totally avoid buying such products.

The Ministry of Health and Family Welfare is responsible for ensuring safe food to the consumers. Keeping this in view, a legislation called "Prevention of Food Adulteration Act, 1954" was enacted. The

objective envisaged in this legislation was to ensure pure and wholesome food to the consumers and also to prevent fraud or deception. The Act has been amended thrice in 1964, 1976 and in 1986 with the objective of plugging the loopholes and making the punishments more stringent and empowering Consumers and Voluntary Organizations to play a more effective role in its implementation. The subject of the Prevention of Food Adulteration is in the concurrent list of the constitution. However, in general, the enforcement of the Act is done by the State/U.T. Governments. The Central Government primarily plays an advisory role in its implementation besides carrying out various statutory functions/duties assigned to it under the various provisions of the Act. The Prevention of Food Adulteration Act is a Central legislation. Rules and Standards framed under the Act are uniformly applicable throughout the country. Besides, framing of rules and standards, the following activities are must be undertaken by the Ministry of Health and Family Welfare.

CONCLUSION:

Adulteration of food products have increased over the years and has become a common problem that affects human health. Lab procedures used to check food quality was once taken as the only option but is not feasible to check every time We can see that from the long history of detecting adulterants the methods adopted to find adulteration have also increased and it needs non-destructive techniques.

From the above review and discussions lastly, we can summarize that the adulteration which is been added in the food items can cause tremendous effect on health without our knowledge. Adulteration can be prevented by few alerting steps of our society. Hike of price of food items should be checked by government. While purchasing food items, selection of wholesome and non-adulterated food is necessary to make sure that such food do not cause and health problems. Though presence of adulterants cannot be ensured by visual examination as toxic contaminants are present in very low level but visual examination before purchase can ensure absence of insects, fungus and other foreign materials. The consumer should avoid buying food from places which do not maintain proper hygiene conditions. Both local and branded food stores should be inspected by government bodies. The above general consciousness is simple and easy to initiate for our healthy life. If we tend to actively participate in these changes then we can bring about a healthy and non-venturous future for the upcoming generations. Moreover, researchers and academia working in different research institute have many gaps to address

related to the topic including assessment of the status, identification of foods susceptible for adulteration in the context of the country, development and validation of detection methods and much more.

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CONFLICT OF INTEREST

There is no conflict of interest.

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