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# Chemical Analysis of Adulterants in Common Food Items and There Hazardous Effect on Health

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***Abstract:***
*Food adulteration is being done all over the world. It differs from one country to another country. It also differs from one part of the country to another part. In this study we have taken some selected common food samples these are standard, substandard and loose etc. which are mostly used by the common people which include Tea, sugar, jaggery, Dry Red chillies, chilli powder, turmeric powder, coriander powder, dry coconuts, Til (sesame seeds) poppy seeds, shah zeera, mustard seeds, cinnamon and Brown (gavran) Eggs that are available in the local market of Aurangabad (M.S), which is chemically analysed for their adulterants present in them. The adulterants which are used for adulteration was very much similar in look, colour, texture, etc. that of the real food samples, it is difficult to detect by colour, visual or ordinary examination. The chemical tests revealed presence of adulterants such as used tea in loose tea sample. Chalk powder in loose sugar sample, sodium bicarbonate in loose Jaggery sample, Rhodamine B colour in loose samples of Dry red chillies. Oil soluble coal tar dye Rhodamine B colour and metanil yellow dye in chilli powder and turmeric powder respectively. Salt and saw dust or wood dust in coriander powder, exhausted dry coconuts found in dry coconuts, fine stones, sands and rajgira in poppy seed. Cumin seeds & argemone seeds in shah zeera & mustard seeds respectively. Cassia bark is found in loose cinnamon. Brown Eggs outer shells are found to be dyed with tea decoction. All the dyes used as adulterants are highly carcinogenic and may cause paralysis, brain damage, liver damage, kidney stone, glaucoma, blindness, heart attack or even sudden death if taken for long time. Other adulterants when consumed may cause anaemia, diarrhea, stomach disorder, giddiness, and damages digestive tract etc. Young children and senior citizens with poor immunity are mostly affected by these adulterants. Hence, this study is to make society aware of food adulteration and to know there hazardous effects on health.*

***Keywords:*** *food, adulteration, mixing, adulterants, colour adulterants.*

## 1. Introduction

Food is the basic necessity of life. Food Adulteration may be defined as intentionally or unintentionally addition or substitution of food substances by inferior or cheaper substances which may be injurious to health.[1]Food adulteration is being done all over the world. It differs from one country to another country. It also differs from one part of the country to another part. Material used for adulteration are very much similar in look, colour etc. and it is difficult to detect by visual, colour or ordinary examination. Economic point of view is the most important factor responsible for food adulteration to make the large margin of profit. An adulteration in food is done either for financial gain or due to carelessness and lack in proper hygienic condition of processing, storing, transportation and marketing.[1,2] On the other hand; adulteration may be incidental contamination, which is usually due to ignorance, negligence or lack of proper facilities. Food adulteration includes a large number of practices such as mixing, substituting, concealing the quality, misbranding, expired products for sale, sticking false labels, adding of poisonous substances etc in foods.[2, 3] In this study we have taken some selected common food samples these are standard, substandard and loose etc which are mostly used by the common people that are available in the local market of Aurangabad (M.S) which are chemically analysed for their adulterants present in them. The adulterants which are used for adulteration was very much similar in look, colour, texture, etc. that of the real food samples, it is to make the distinction difficult by visual, colour or ordinary examination. The dyes added as adulterants are highly carcinogenic and may cause paralysis, brain damage, kidney stone, liver damage, glaucoma, blindness, heart attack or even sudden death if taken for long time. Other adulterants when consumed may cause anaemia, diarrhoea, stomach disorder, giddiness and damages digestive tract etc. The aim of present work is to make society aware of the addition of food adulterants in foods available in the local market of Aurangabad (M.S). It is equally important for the society to know the common adulterants and their effect on health.

**2. Materials and Methods**

The chemicals used for analysis were of A.R grade. All qualitative tests for identification of adulterants were done by using standard procedure in the laboratory. In this study we have taken some selected common food samples these are standard, substandard and loose etc which is mostly used by the common people which includes Tea, sugar, jaggery, Dry Red chillies, Chilli powder, Turmeric powder, Coriander powder, Dry coconut, Til (sesame seeds) , khash-khash ( poppy seeds), mustard seeds, shah zeera, Dalchini (cinnamon bark) and Brown (gavran) Eggs that are available in the local market of Aurangabad which are chemically analysed for their adulterants present in them.

**3. Results and Discussion**

| Sir no | Food items | Adulterants | Health effects |
|---|---|---|---|
| 1 | Tea | Iron fillings, Leather flaks, colour dyes, | Injurious to health, Tetanus, stomach disorders. |
| 2 | Sugar | chalk powder, washing soda, | kidney stone, diarrhoea, Injurious to health |
| 3 | Jaggery | dirt, stone, threads, salt, chalk powder, sodium bicarbonate, white sugar | Damage digestive tract, diarrhoea, stomach disorders, giddiness |
| 4 | Dry Red chilly | Rhodamine B dye, | Highly Carcinogenic |
| 5 | Chilli powder | Brick powder, Sudan III colour, saw dust, | Damage digestive tract, Carcinogenic |
| 6 | Coriander powder | Foreign particles, common salt, saw dust, dung powder. | Diarrhoea, stomach disorders, giddiness |
| 7 | Turmeric powder | Chalk powder, metanil yellow dye, lead chromate. | Kidney stone, Anaemia, , paralysis, brain damage, abortion and highly carcinogenic |
| 8 | Dry coconut (khopra) | Exhausted coconut, fungus | Stomach disorders |
| 9 | Til (sesame seeds) | Exhausted til, fine stones | Damage digestive tract, Stomach disorder |
| 10 | Poppy seeds(khash-khash) | Black stones, sand, dirt, rajgira | Diarrhoea, stomach disorders & giddiness |
| 11 | Mustard seeds | Sand ,dirt, fine stones, & argemone seeds | Heart attack, Glaucoma, blindness, stomach disorders, giddiness, diarrhoea |
| 12 | Shah zeera | Sand, sticks, Grass seeds, | Diarrhoea, stomach disorders |
| 13 | Dalchini (Cinnamon bark) | Dirt ,cassia bark, other plant Bark | Liver damage |
| 14 | Brown (Gavran)Eggs | Tea decoction | Cholestol problem |

*Table 1: Some Injurious Adulterants in common Food samples and Their Health Effects*

| Food items | Sample tested | Observation for adulterants | Adulterants detected |
|---|---|---|---|
| Tea | 1-standard<br>2-sub standard<br>3-loose | Not found<br>Not found<br>Found | ----<br>---<br>used tea, iron flaks |
| sugar | 1-standard<br>2-sub standard<br>loose 3-loose | Not found<br>Found<br>Found | ------<br>Chalk powder<br>Chalk powder, white stone |
| Jaggery | 1-standard<br>2-sub standard<br>3-loose | Found<br>Found<br>Found | Foreign matter like stone, sand & salt<br>Foreign matter like sand, jute threads & salt<br>Foreign matter like stone jute threads, salt and sodium carbonate |
| Dry Red Chilly | Loose-1<br>Loose -2<br>Loose-3 | Found<br>Found<br>Found | Small size chillies, chilli stems,<br>Small size chillies, chilli stems, colour dye<br>Small size chillies, chilli stems and Rhodamine B dye |
| Chilli | 1-standard | Not found | ------ |

| | | | |
|---|---|---|---|
| powder | 2-sub standard<br>3-loose | Found<br>Found | Coal tar Dye,<br>Rhodamine B colour, Brick powder. |
| Coriander powder | 1-standard<br>2-sub standard<br>3-loose<br>4-loose | Not found<br>Found<br>Found<br>Found | -----<br>Salt,<br>Salt, saw dust<br>Salt, saw dust or wood dust |
| Turmeric powder | 1-standard<br>2-sub standard<br>3-loose | Not found<br>Found<br>Found | ------<br>Metanil yellow Dye,<br>Metanil yellow Dye, |
| Dry coconut (khopra) | 1-standard<br>2-loose (grated)<br>3-loose (whole) | Not found<br>Found<br>Found | -----<br>Rancid smell, exhausted coconut<br>Exhausted coconut, fungus |
| Poppy seeds | 1-standard<br>2-sub standard<br>3-loose | Found<br>Found<br>Found | Sand, stones.<br>Sand, stones, rajgira<br>Sand, stones, rajgira |
| Til (sesame seeds) | 1-standard<br>2-loose<br>3-loose | Found<br>Found<br>Found | Fine stones<br>Fine stones, small size till<br>Fine stones, exhausted shrink till |
| Mustard seeds | 1-standard<br>2-loose<br>3-loose | Found<br>Found<br>Found | Fine stones<br>Fine stones, argemone seeds<br>Fine stones, argemone seeds |
| Shah zeera | 1-standard<br>2-loose<br>3-loose | Found<br>Found<br>Found | Fine stones<br>Sand, dirt<br>Sand, dirt, grass seeds coloured with charcoal |
| Pure Dalchini (cinnamon bark) | 1-standard<br>2-loose<br>3-loose | Not found<br>Not found<br>Found | ----<br>Cassia bark, other plant bark<br>Cassia bark |
| Brown (Gavran) Eggs | 1-standard<br>2-loose<br>3-loose | Found<br>Not found<br>Found | Outer shell of eggs was dyed with Tea decoction ------<br>Outer shell of eggs was dyed with Tea decoction |

*Table 2: Detection of Adulterants in common food items*

The present study revealed that Tea: (loose) samples were found to be adulterated with used tea as used tea settles down when added in water and Iron flakes was observed when magnet is kept over loose tea sample. Sugar: Both samples substandard and loose shows effervescence when treated with dil HCL which indicates presence of chalk powder in them. Jaggery: All samples standard, substandard & loose were adulterated with salt as they show white precipitate with $AgNO_3$ & foreign matter like thread, mud etc floats on water, whereas loose jaggery when treated with HCL, appearance of effervescence indicates presence of sodium bicarbonate in them. Dry Red Chillies: paraffin soaked cotton when rubbed on Loose-1, loose-2 samples of dry chillies, cotton turns red with Rhodamine B colour and when hand picking done on all samples they found adulterated with low quality dry chillies and chilli stems. Chilli powder: when substandard sample treated with ether and HCL, layer turn red which indicates presence of oil soluble coal tar dye in them & loose sample was burn on flame they give brick red colour flame of calcium salt which indicates presence of brick powder in them. Loose chilli powder was found dark in colour as compared to standard sample. Turmeric powder: In substandard and loose turmeric samples by addition of HCL pink colour appears which indicated presence of metanil yellow dye in them. Coriander powder: In substandard and loose samples when treated with $AgNO_3$ gives white precipitation this indicates presence of common salt as adulterant in them. Both the loose samples when added in water saw dust and wood dust float which indicates addition of saw dust or wood dust as adulterant in them. Dry coconut: In Loose (grated) sample rancid smell observed, due to rancidity Vitamin A and E are destroyed and when it kept on tissue paper no coconut oil spots found they were very dry it indicates coconut oil is exhausted. In loose sample (whole) very dry coconut observed by visual examination and fungus was observed when seen by magnifying glass. Til: All samples when water is added til floats and fine sand settles down it indicates they were adulterated. Poppy seeds: All samples were found to be adulterated with sand, stones and rajgira as sand, stones settles down and rajgira float on surface when added in water. Shah Zeera: In all samples when water is added shah zeera floats and fine sand settles down. Loose sample - 3 when rub on tissue paper give black colour of charcoal this indicates they are adulterated. Mustard seeds: In standard, substandard and loose samples fine stones observed when seen through the magnifying glass and argemone seeds observed that indicated they are adulterated. Cinnamon: Cassia bark is found in loose-2, loose-3 cinnamon samples by visual examination and hand picking. Brown (gavran) Eggs: Standard and loose samples when boiled in hot water smell of tea observed and water turns slightly red as tea decoction. Outer shell of white small eggs was found dyed with tea decoction to make them look like gavran eggs. Brown (gavran) eggs are considered to be more nutritious than white boiler eggs so they were sold very costly and hence they are adulterated.

**4. Conclusion**

The present work revealed and concludes that adulteration found in the common food samples is very much carcinogenic and injurious to health. They may also cause several diseases when consumed for long time. It is essential for society to make sure that common foods do not cause any health hazard. Although it is not possible to detect adulterants in food only on visual examination when hazardous adulterants are mixed in them. Only visual examination of the food before purchase makes sure to ensure absence of insects, visual fungus, foreign matters, etc. Before purchase do not forget to check the label declaration on packed food for knowing the ingredients and nutritional value. It also helps in checking the freshness of the food and the period of best before use. Public should avoid taking food from an unhygienic place such types of food items may cause various diseases. It is advised to buy certified food items from reputed shop and should avoid buying loose food items from the local market. Government should check the food items sold loosely on local shops and make society aware of food adulteration. Thus the findings of this work are very much useful to the society in general & citizens in particular.

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