

Review Article

Qualitative Assessment of Food Adulterants for Food Safety in Grocery Store at Avinashi (Tirupur District)

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Abstract

Food is any substance, composed of carbohydrates, water, fats and proteins, which can be eaten or drunk by animals, including humans, for nutrition or pleasure. By other words food is one of the basic needs for every living being and very important aspect for life. Food can be contaminated by different adulterants. Adulterants are chemical substances which should not be contained within other substances (e.g. food, beverages, fuels for legal or other reasons). The addition of adulterants is called adulteration. Adulterated foods are harmful for human health as they contain the unauthorized food ingredients. The harmful effects for human such as stomach disorder, giddiness and joint pain, diarrhoea, liver disorder, dropsy, gastrointestinal problems, respiratory distress, oedema, cardiac arrest, glaucoma, carcinogenic effects, paralysis etc. The aim is to evaluate the presence of adulterant from daily uses food materials like Milk, Butter, Edible oil, Honey, Pulses, Wheat Flour, Black Pepper, Chilli powder, Coffee powder which we collected from different departmental and local grocery stores and checked the presence of individual adulterants by biochemical qualitative analysis. The colour change of the sample indicate the according to the reagents is indicates the presence of different adulterants. This information can help to grow the food safety and also people can be aware about the food brands for a healthy life.

Keywords: Adulterants; Branded and unbranded; Food safety; Human health; Qualitative analysis

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Introduction

Adulteration of food stuffs is commonly practiced in India by the trade. The consumers like to get Maximum quantity for a price as low as possible. Adulteration includes 1) Intentional addition, substitution or abstraction or substances which adversely affect the purity and quality of foods. 2) Incidental contamination of foods with deleterious substances such as toxins and insecticides due to ignorance, negligence or lack of proper storage facilities. 3) Contamination of the food with harmful insects, micro-organism like bacteria, fungus, moulds etc. during production, storage and handling [1].

Adulteration is the act of either adding extraneous substances (adulterants) into food items or reducing essential nutrients partly or wholly for financial gain or due to carelessness and lack of proper hygienic condition during processing, storing, transportation and marketing. This ultimately results that the consumer is either cheated or often becomes victim of diseases. Adulterants are chemical substances which should not be contained within food or beverage, and may be intentionally added to more expensive substances to increase visible quantities and reduce manufacturing costs, or for some other deceptive or malicious purpose. Because of that it is important for the consumer to know the common adulterants and their effect on health since the increasing number of food producers and the outstanding amount of foodstuffs import enables the producers to mislead and cheat consumers [2].

Adulteration is present in society from a long time but is was not noticed due to its small scale use and its low impact. However, at the present era. Economic adulteration is a long term problem affecting the food industry at its most drastic level.

According to one survey conducted, adulteration were detected in milk to the tune of 70% with water, turmeric powder - 43% with chalk powder, red chili powder-100% with artificial colour, sugar 37% with chalk powder etc. [3].

The general objective of the study is 1) to assess the presence or absence of adulterants in collected sample. 2) To evaluate the foreign material used in food materials.

Materials and Methods

Selection of Study Area

Food is the basic necessity of life. One works hard and earns to satisfy our hunger and relax later. But at the end, many of us are not sure of what we eat. We may be eating a dangerous dye, sawdust, soap stone, industrial starch and aluminium foil. Contaminated foods and drinks are common sources of infection [4].

The sample for the study were selected is Avinashi (Town and village) under the Tirupur district. Avinashi is a special grade town panchayat and taluk head quarters in Tirupur district is the Indian state of Tamil Nadu (Tirupur.tn.nic.in). For assess the qualitative testing of presence or absence of food adulteration for the collected varies sample both branded and unbranded under random sampling method. The sample were collected from the selected 10 village from Avinashi taluka of Tirupur district. The list were follows.

1. Ayyampalayam
2. Cheyur
3. Kaniampoondi
4. Kanur
5. M.S.V Palayam
6. Pongalur
7. Nambiyapalayam
8. Uppilipalayam
9. Karuvalur
10. Naduvacheri

Collection of Samples

Adulteration means the addition of ingredients which are not permitted in food. They are added because of business profit only. Adulterated foods are harmful for human health as they contain the unauthorized food ingredients. Adulteration in foods also decreases our moral social value [5].

The regular usage of food ingredients by housewives and on the basis of basic food groups the samples of the food items were selected. The list of the food items were selected for the study. The list were given below in table 1.

S. No	Food Items
1	Wheat flour
2	Rice flour
3	Bajra
4	Parboiled Rice
5	Refined wheat flour
6	Roasted Bengal gram dhal
7	Green gram dhal
8	Urad dhal
9	Toor dhal
10	Ghee
11	Butter
12	Sunflower oil
13	Coconut oil
14	Groundnut oil
15	Milk
16	Curd
17	Khoa
18	Icecream
19	Pepper
20	Cloves
21	Asafoetida powder
22	Chilli powder
23	Sugar
24	Honey

Table 1: List of the food items were selected for the study.

To find out where the branded or unbranded which product have maximum adulteration is taken place the sample were collected on both branded and unbranded on the listed food items. The selected area of the 10 village from Avinashi Taluk on random sampling method the available departmental and local grocery stores in the selected village both branded and unbranded sample were collected. Five sample of each food items (n=24) were collected from both branded and 52 unbranded at 55 stores. After the collection of the sample, the quality tests were done.

Analysis of Samples

Adulteration is commonly practiced in both branded and unbranded foods in daily life. From local market to the hyper market adulteration is prevalent everywhere. Majority of adulteration in India is Intentional adulteration and it affects the people of all the age group. Even today many people in India are unaware about adulteration and its harmful effects. Even if they know, they seldom take steps to stop adulteration. The carelessness of the buyers makes/encourages the traders to add unpermitted additives [6]. In collected samples to qualitative test are done for detecting presence or absence of adulterant by using standard procedure (FSSAI). Since the analysis of food adulteration was completed for five or six months.

Results and Discussion

Lakshmi V [7], reported adulteration in Turmeric dals and pulses such as moong or channa were the adulterant is metanil yellow and kesari dha (added to enhance the yellow colour of a food substance). It is harmful effect is that it is highly carcinogenic and if consumed over a continuous period of time it can also cause stomach disorders. Green chillies, green peas and other vegetables were adulterants with malachite green. Argenone seeds that is a coloured dye that has proven to be carcinogenic for humans if consumed over a long period of time. Mustard seeds and mustard oil were adulterant is argenone seeds and papaya seeds that the consumption of these could cause epidemic dropsy and severe glaucoma.

The results of qualitative analysis of food adulteration in selected food products are shown in table 2. The results of food items were discussed below.

S.No	Food Item	Adulterant	Brand Tested	Result for Adulterant	Un Brand Tested	Result for Adulterant
1	Wheat flour	Bran	Sample A Sample B Sample C Sample D Sample E	Absent Absent Present of Maida Present of Maida Absent	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Absent Absent
		Chalk powder				
		Maida				
2	Rice flour	Chalk powder or Lime powder	Sample A Sample B Sample C Sample D Sample E	Present of Lime powder Absent Absent Absent Present of lime powder	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Absent Absent

3	Bajra	Infested ergot seed	Sample A Sample B Sample C Sample D	Absent Absent Absent Absent	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Absent Absent
4	Par-boiled Rice	Metanil yellow	Sample A Sample B Sample C Sample D	Present Present Present Absent	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Absent Absent
5	Refined wheat flour	Chalk powder	Sample A Sample B Sample C Sample D Sample E	Present Present Present Present Present	Sample A Sample B Sample C Sample D Sample E	Absent Absent Present Present Present
6	Roasted Bengal gram dhal	Khesari dhal	Sample A Sample B Sample C Sample D Sample E	Present Present Absent Absent Present	Sample A Sample B Sample C Sample D Sample E	Absent Present Present Absent Absent
7	Green gram dhal	Khesari dhal	Sample A Sample B Sample C Sample D Sample E	Present Present Absent Absent Present	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Present Absent
8	Urad dhal	Khesari dhal	Sample A Sample B Sample C Sample D Sample E	Absent Absent Present Present Present	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Present Present
9	Toor dhal	Khesari dhal	Sample A Sample B Sample C Sample D Sample E	Present Absent Absent Present Present	Sample A Sample B Sample C Sample D Sample E	Present Absent Absent Absent Absent
10	Ghee	Vanaspatti or Margarine	Sample A Sample B Sample C Sample D	Present Present Present Present Present Absent	Sample A Sample B Sample C Sample D Sample E	Present Present Absent Absent Absent
		Mashed potatoes	Sample E			
		Coalter dye	Sample F Sample G Sample H			
11	Butter	Vanaspatti or Margarine	Sample A Sample B Sample C	Absent Absent Absent	Sample A Sample B Sample C	Absent Absent Absent
12	Sun-flower oil	Argemone oil	Sample A Sample B Sample C Sample D Sample E	Present Present Present Present Present	Sample A Sample B Sample C Sample D Sample E	Absent Absent Present Present Absent
		Castor oil				
13	Coconut oil	Any other oil	Sample A Sample B Sample C Sample D Sample E	Absent Present Present Present Absent	Sample A Sample B Sample C Sample D Sample E	Present Present Absent Absent Absent

14	Groundnut oil	Argemone oil	Sample A Sample B Sample C Sample D Sample E	Present Present Present Absent Present	Sample A Sample B Sample C Sample D Sample E	Present Absent Absent Absent Absent
		Castor oil				
15	Milk	Starch	Sample A Sample B Sample C Sample D Sample E Sample F	Absent Present Present Present Present Absent	Sample A Sample B Sample C Sample D Sample E	Present Present Absent Absent Absent
		Urea				
		Vanaspatti				
		Formalin				
		Detergent				
16	Curd	Vanaspatti	Sample A Sample B Sample C Sample D Sample E Sample F Sample G	Absent Absent Absent Absent Absent Absent Absent	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Absent Absent
17	Khoa	Starch	Sample A Sample B Sample C	Absent Absent Absent	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Absent Absent
18	Ice-cream	Metanil Yellow	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Absent Absent	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Absent Absent
19	Black Pepper	Papaya seeds	Sample A Sample B Sample C	Present Present Present	Sample A Sample B Sample C	Present Present Absent
20	Cloves	Volatile oil Extrated cloves	Sample A Sample B Sample C	Absent Absent Absent	Sample A Sample B Sample C Sample D Sample E	Absent Absent Absent Absent Absent
21	Asa-foetida powder	Soapy stone	Sample A Sample B Sample C Sample E Sample F	Present Present Present Present Present	Sample A Sample B Sample C Sample D Sample E	Absent Absent Present Present Absent
22	Chilli powder	Brick powder, salt powder or talc, powder.	Sample A Sample B Sample C Sample E	Present Present Present Present	Sample A Sample B Sample C Sample D Sample E	Present Present Absent Absent Absent
		Rhodamine B				
23	Sugar	Chalk powder	Sample A Sample B	Absent Absent Absent	Sample A Sample B Sample C	Absent Absent Absent
		Urea				
		Yellow colour (Non-permitted)				
24	Honey	Sugar solution	Sample A Sample B Sample C Sample E	Present Present Present Present	Sample A Sample B Sample C Sample D Sample E	Present Present Absent Absent Absent
		Invert sugar				

Table 2: Results of qualitative analysis of food adulteration in selected food products.

Wheat Flour: The results of wheat flour in branded products out of five sample from each Avinashi town and village two sample of were adulterated with maida and in unbranded sample no sample were adulterated.

Rice Flour: The results of Rice flour in branded products out of five sample from each Avinashi town and village two sample of were adulterated with lime powder and in unbranded sample no sample were adulterated.

Bajra: The results of Bajra in branded products out of four sample from each Avinashi town and village no sample of were adulterated and in unbranded no sample were adulterated.

Parboiled Rice: The results of parboiled rice in branded products out of four sample from each Avinashi town and village four sample of were adulterated with metanil yellow and in unbranded sample no sample were adulterated.

Refined Wheat Flour: The results of refined wheat flour in branded products out of five sample from each Avinashi town and village five sample of were adulterated with chalk powder and in unbranded three sample were adulterated.

Roasted Bengal Gram Dhal: The results of Roasted Bengal gram dhal in branded products out of five sample from each Avinashi town and village all sample of were adulterated with khesari dhal and in unbranded sample no sample were adulterated.

Green Gram Dhal: The results of Green gram dhal in branded products out of five sample from each Avinashi town and village two sample of were adulterated with Khesari dhal and in unbranded sample one sample were adulterated.

Urad Dhal: The results of Urad dhal in branded products out of five sample from each Avinashi town and village three sample of were adulterated with Khesari dhal and in unbranded sample two sample were adulterated.

Toor Dhal: The results of Toor dhal in branded products out of five sample from each Avinashi town and village two sample of were adulterated with Khesari dhal and in unbranded sample one sample were adulterated.

Ghee: The results of Ghee in branded products out of eight sample from each Avinashi town and village six sample of were adulterated with Vanaspathi, Coalter dyes and in unbranded five sample two sample were adulterated.

Butter: The results of Butter in branded products out of three sample from each Avinashi town and village no sample of were adulterated and in unbranded sample no sample were adulterated.

Sunflower Oil: The results of sunflower oil in branded products out of five sample from each Avinashi town and village five sample of were adulterated with mineral oil and in unbranded sample two sample were adulterated.

Coconut Oil: The results of coconut oil in branded products out of five sample from each Avinashi town and village three sample of were adulterated with other oil and in unbranded sample two sample were adulterated.

Groundnut Oil: The results of groundnut oil in branded products out of five sample from each Avinashi town and village four sample of

were adulterated with castor oil and in unbranded sample one sample were adulterated.

Milk: The results of milk in branded products out of six sample from each Avinashi town and village two sample of were adulterated with urea and in unbranded five sample two sample were adulterated.

Curd: The results of curd in branded products out of eight sample from each Avinashi town and village no sample of were adulterated and in unbranded sample no sample were adulterated.

Khoa: The results of khoa in branded products out of three sample from each Avinashi town and village no sample of were adulterated and in unbranded five sample no sample were adulterated.

Icecream: The results of icecream in branded products out of five sample from each Avinashi town and village no sample of were adulterated and in unbranded sample no sample were adulterated.

Pepper: The results of pepper in branded products out of three sample from each Avinashi town and village three sample of were adulterated with papaya seeds and in unbranded sample two sample were adulterated.

Cloves: The results of cloves in branded products out of three sample from each Avinashi town and village no sample of were adulterated and in unbranded five sample no sample were adulterated.

Asafoetida Powder: The results of asafoetida powder in branded products out of five sample from each Avinashi town and village five sample of were adulterated with soapy stone and in unbranded sample two sample were adulterated.

Chilli Powder: The results of chilli powder in branded products out of four sample from each Avinashi town and village all sample of were adulterated with Rhodamine B and in unbranded five sample two sample were adulterated with brick powder.

Sugar: The results of sugar in branded products out of two sample from each Avinashi town and village no sample of were adulterated and in unbranded three sample no sample were adulterated.

Honey: The results of honey in branded products out of four sample from each Avinashi town and village four sample of were adulterated with invert sugar and in unbranded five sample two sample were adulterated with sugar solution.

Conclusion

In this study the adulteration is practiced both in branded and unbranded food items of Avinashi town and village. Adulteration is intentional added to the food items and now a day it was increasing randomly. The regularly consumption of adulterant like metanil yellow, kesari dhal, argenone seeds and papaya seeds lead to harmful effects of stomach disorders, carcinogenic, epidemic dropsy and severe glaucoma.

Declaration

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Conflicts of Interest: The author declared that they have no conflicts of interest.

Ethical Approval: The researcher explained the study objectives to participants. Before taking part in the study, participants provided written informed consent. The study was approved by the Institutional Human Ethics Committee of Avinashilingam University and approval no is AUW/IHEC/RVS-20-21/XPD-01.

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Code Availability: Not applicable.

Author Contributions: Both author design the research and writing the field work. Author read and approved the final manuscript.

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