

Common Food Adulterants in Food Materials – Research Article

Shamalabanu^{1*}, Meera Raman²

¹ Research scholar, Department of Food and Nutrition, RVS Arts and Science College, Tamilnadi, India

² Associate professor, Department of Food and Nutrition, Dr. NGP college of Arts and Science, Coimbatore, Tamil Nadu, India

E-mail: ¹shamalpmuthunov09@gmail.com

ABSTRACT:

Food is taken in the body to support the different biochemical and physiological activities. Adulteration means substance is added to food for profit basics. To identify various samples of presence of adulteration in parboiled rice, wheat flour, rice flour, maida, chilli powder, pulses, milk, asofoetida powder and ghee. After the analysis the products containing adulterants were identified in branded and unbranded food products. Adulterants food shows a health hazard. Harmful effects of consuming adulterants in food leads to stomach disorder, giddiness and joint pain, diarrhea, liver disorder, dropsy, gastrointestinal problems, respiratory diseases, cardiac arrest, glaucoma, carcinogenic effects, paralysis etc.. This study shows the presence of adulterant in food and hence much attention is needed for the both branded and unbranded products to purchase adulterant free foods.

Keywords: Food, Adulterants, health hazards, Profit, branded products, Maida, chilli powder and pulses

INTRODUCTION

Food is stuff of either plant or animal origin which in raw, processed or semi-processed form will take in the body in order to support the different biochemical and physiological activities of our body. Most of the times, these foods are prone to food fraud and adulteration lead to health disorder to consumers. Addition of fake substances or removal or replacement of genuine substances without the purchaser's knowledge for economic gain by the seller. Though traditionally people cook and eat the foods with health process and incidents at home, in modern times, change in life style and raise in income leads more and more peoples to have ready to eat foods at restaurant on regular basis. (Alauddin, 2012).

Adulteration of foods is done by many means but broadly there are two types of adulterants. **Intentional adulteration** is an adulteration in which food item is deliberately adulterated. The adulterant could be physical or biological in nature. It is done in order to promote the level of their essential nutrients after reduction of a given amount in order to increase their profit margin by several chemicals like urea, melamine and increase, roasted its volume by adding substance such as starch, flour, cane sugar, vegetable oils, water, skim milk, sand,

chalk powder, molasses, stone, brick powder, ergot, chicory, barley powder, grinded papaya seeds, etc. into various food items (El-Loly *et al.*, 2013)

Incidental Adulteration is pesticides residues, dropping of rodents, larvae in foods, etc. Metallic contamination with arsenic lead, mercury can also occur accidentally. Accidental adulterants also involve pests such as rodents and insects that trespasses the food at high degree and produces impurity in the form of excreta, bodily secretions and spoilage through micro-organisms (Pandit *et al.*, 2002)

METHOD AND MATERIALS

1. Selection of Area and Samples

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 products include ;

1. Parboiled rice
2. Wheat flour
3. Rice flour
4. Maida
5. Pulses
6. Milk
7. Chilli powder
8. Pepper
9. Asofeotida
10. Ghee

In order to compare the presence of adulteration between branded or unbranded which products samples were collected included both branded and unbranded on the listed food items. Each sample was collected from the departmental and local grocery stores in the selected village and town of Avinashi. Five sample of each food items (n=10) were collected from both branded and 52 unbranded at 55 stores. After the collection of the sample, the quality tests were done.

2. Analysis of sample:

The samples were collected on the basis of basic food groups. After collected food products they were named as Sample A, Sample B, Sample C, Sample respectively and it as note as branded\unbranded. It was neatly packed and labeled used for analysis.

RESULTS AND DISCUSSION

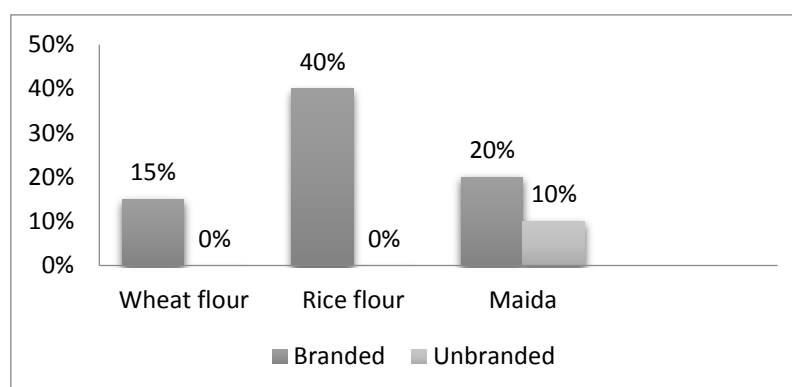
Common adulterants in Foods

Adulterated foods can lead to different health problems after consumption and are considered as one of the major problems of everyday life. A chunk of the green leafy vegetables sold in Chennai is found to contain toxic metals that have the potential to harm various organs of the body. It is common in almost all developing countries. And their ugly faces come out in the form of their harmful effects as stomach disorder, giddiness and joint pain, diarrhea, liver disorder, dropsy, gastrointestinal problems, respiratory diseases, cardiac arrest, glaucoma, carcinogenic effects, paralysis etc., Therefore, health concerns related to food adulteration as can be understood from this review include food poisoning, stomach ache, indigestion, loose stools, cough, fever, vomiting or nausea, aphthae in mouth out of infection from adulterated food and etc. (Mansuri, 2011)

1. Chalk powder

The chalk powder consists of calcium carbonate and is added as an adulterant in rice flour, wheat flour, sugar, jaggery, common salt. For profit basis the chalk powder is added to the foods. The data analysed is presented in the **figure - 1**

Figure – 1. Chalk powder content in food products



In the study the analysis resulted that wheat flour in branded 15% adulterated with chalk powder and Rice flour are also in branded 40% adulterated with chalk powder. In Maida the 20% in branded and 10% in unbranded. The sugar shows that absence of adulterations.

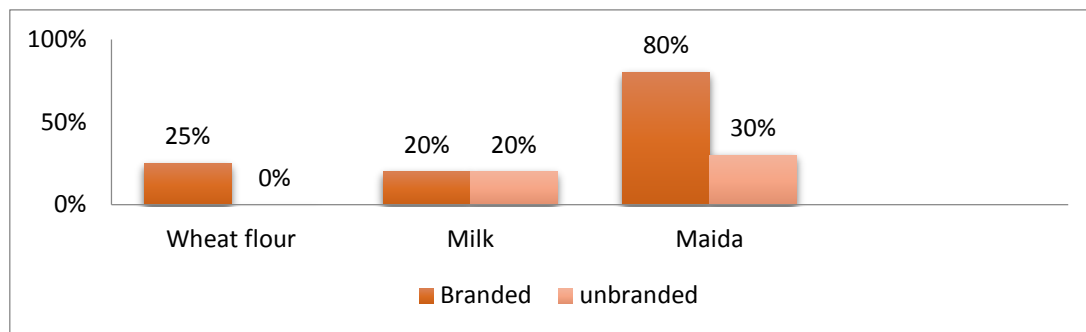
Similar results were shown in a study carried out by Navya. P *et al.*, (2017) in Secunderabad, selected food items were analyzed for detection of adulterants purchased from local grocery stores. Qualitative tests were carried out. It was found that of the common salt samples tested showed positive result for the presence of chalk powder.

Hence, stated that the acute health effects caused due to calcium carbonate and calcium sulfate in the chalk dust include eye irritation, skin irritation, irritation in respiratory tract, mucous membrane etc. Chronic exposures may lead to lungs and liver damage (Chi-chi Lin 2015).

2. Boric acid

Boric acid more specifically orthoboric acid, is a compound of boron, oxygen and hydrogen. It is added to extend its shelf life as it acts as antimicrobial agent and insecticide. Its added as adulterant in wheat flour, milk and maida. The food sample were analysed under procedure. The data analysed is presented in the figure - 2

Figure -2. Boric acid content in Food products



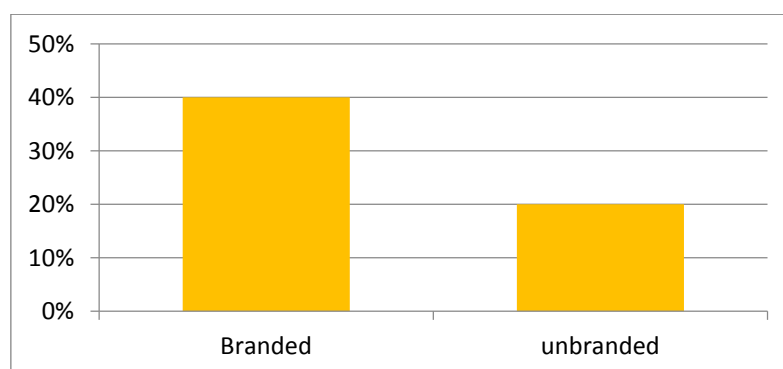
The results of boric acid presence in samples were in wheat flour branded - 25% , in Milk branded- 20% unbranded – 20% and Maida branded -80% unbranded -30% .

Boric acid causes nausea, vomiting, diarrhea, kidney damage, acute failure of circulatory system, and even death.(Mota *et al*; 2003)

3. Formalin:

Formaldehyde is added illegally to food to extend its shelf life due to its antiseptic and preservation properties. It is used as an adulterant in milk to increase the shelf life for long distance. Formalin is highly toxic causes liver and kidney damages. In the food sample analysis the formalin shows the adulterant in both branded and unbranded. The data analysed in presented in the figure - 3

Figure – 3. Formalin content in food products



The results shows that in branded 40% and in unbranded 20% were adulterated.

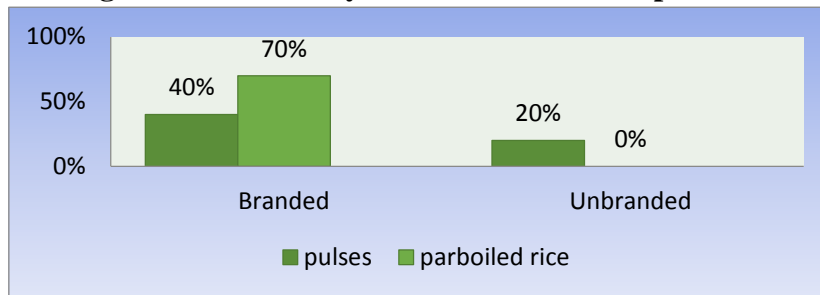
Formalin is a potentially hazardous toxic or injurious substance. It is a potent carcinogen (Gwin *et al*.,2009)

Formalin is used to adulterate milk in order to neutralize milk or to increase its shelf life. Consumption of an elevated dose of formalin can cause vomiting, abdominal pain and diarrhea. It may also disturb the optic nerves and may cause blindness.

4. Metallic Yellow

Metallic yellow provides bright yellow colour. It is an unpermitted food dye. It commonly added as adulterant in Pulses and Parboiled rice. The data analysed is presented in the figure – 4

Figure – 4. Metallic yellow content in food products



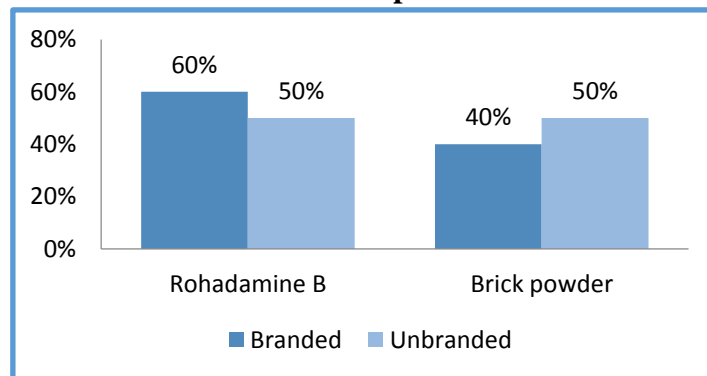
After analysis the few sample shows the presence of metallic yellow and the results states that Pulses in branded – 40% and unbranded 20%, Parboiled rice in branded - 70% and unbranded – 0%.

Metanil yellow a non permitted colour these are non permissible and banned colours and they cause serious health hazards and may also cause cancer in the long run. They are carcinogenic (Ghosh, 2012).

5. Rohadamine B and Brick powder

Rohadamine B is artificial colour and Brick powder is waste material from the production of calibrated brick elements. It added in food as adulterant in Chilli powder.

Figure 5. Rohadamine B and Brick powder content in chilli powder



After analysis the sample the results shows that which adulteration was maximum in chilli powder. About 60% in branded and 50% in unbranded the rohadamine B was adulterated

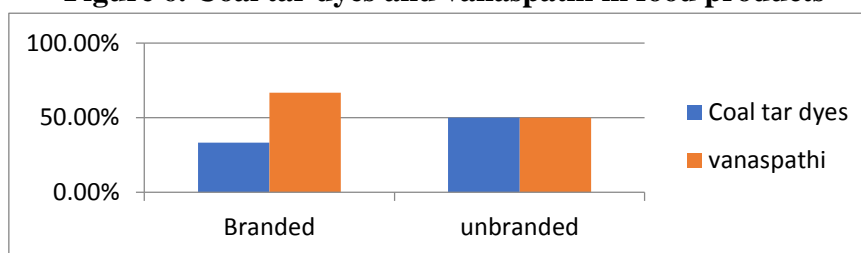
with chilli powder and in brick powder 40% branded and 50% unbranded the brick powder was added as adulterant in chilli powder.

Artificial colours such as coal tar red, para red etc, synthetic pungent compounds, brick powder, talc powder are non plant based adulterants reported in chilli powder (Mitra *et al.*,1961)

6. Coal tar dyes and Vanaspathi

Coal tar dyes and Vanaspathi are added adulterant in ghee. Coal tar dyes are a group of artificial ingredients consisting of colours or dyes, present in virtually every cosmetic product. Vanaspathi is white and grainy textured fat which is made from vegetable oils which are converted to solid form by the process of hydrogenation. In process of adding the dyes and Vanaspathi to ghee in order to increase its volume or reduce its cost. The data analysed is presented in the figure – 6.

Figure 6. Coal tar dyes and vanaspathi in food products

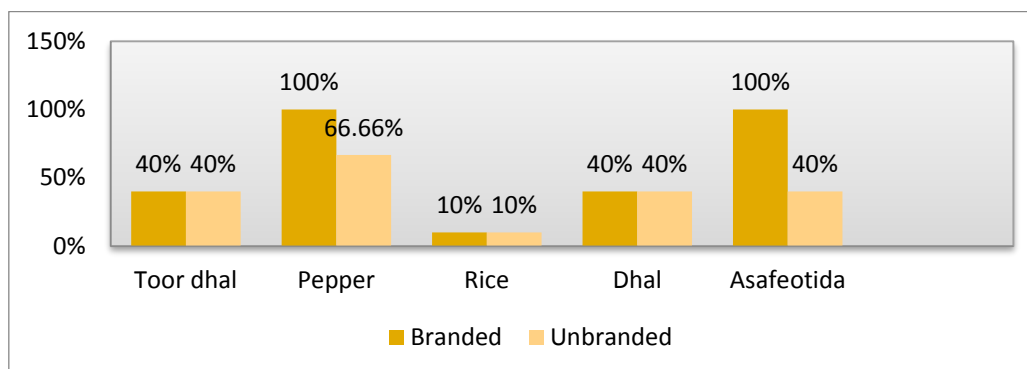


After analysis the results states that in ghee Branded about 66.6% were adulterated with vanaspathi and 33.3% were adulterated with coal tar dyes. Unbranded about 50% were adulterated with vanaspathi and Coal tar dyes.

7. Dhatura/Khesari Dhal, Papaya seeds and Extraneous materials:

Khesari dhal were added to the toor dhal for the purpose of increase the volume and for low of cost. The Extraneous materials include rodent, insect, decomposed material due to parasitic or nonparasitic causes, miscellaneous matter like sand, dust, soil, rust or other foreign. These materials were added in rice, dhal, cloves and sugar to make the volume increase in foods.

Figure 7. Dhatura/Khesari Dhal, Papaya seeds and Extraneous materials:



The result states that the toor dhal is about 40% adulterated in both branded and unbranded. Papaya seeds were added in pepper for increase the quantity of food. The result states that pepper were adulterated with papaya seed is about 100% in branded and 66.6% in unbranded.

The amounts of nutrients deducted and extraneous substances added into food items that are done by business oriented people just forgetting the humanity behind of money making mentality (Awasthi *et al.*,2014)

IV CONCLUSION

Adulteration is common problems in developing countries which lead to lack of facility for detection, awareness and small number of professionals with the discipline. It is practice in both branded and unbranded product for economic gain for seller. All the food categories including milk, honey, cereals and products and pulses etc are prone to adulterated. The adulterants may cause health hazard while consume on daily life. Government bodies should inspect food quality both in branded and unbranded products.

Acknowledgements

The work was not supported by any foundation.

Author Contributions

Implemented the idea, Collected literature, analysed content and wrote the manuscript.

Declarations

The author declared that there is no conflict of interest.

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