



REVIEW ARTICLE

FOOD ADULTERATION: AN AYURVEDIC PERSPECTIVE

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ABSTRACT

“Let food be thy medicine and medicine be thy food” these words of Hippocrates highlight the importance of food. In the present era when everything is seen as a profit or loss statement, the food we eat has also been affected to a marked extent. Adulteration is accidental or intentional addition of any substance to a food item in order to increase the quantity in raw form or prepared form, which may result in the loss of actual quality of them. The health hazards of adulterated food may range from simple malnutrition to grievous cancer. The combination of different poisonous or non-poisonous substances resulting in a toxic or deteriorating effect on health comes under the concept of *garavishain* Ayurveda. One of the forms of *garavishais* *vishayuktaanna*. Its effects may include anaemia, emaciation, GIT problems, neurological problems, liver disorders, oedema etc. It can be seen that the effects on conception of adulterated food are very similar to those of *garavisha*. The prevention and treatment of those abnormal health events due to adulteration can thus be adopted as per the *garavisha* line of treatment.

**Key words:** *Agada, Ahara, Ayurveda, Food, Food adulteration, Garavisha, Shodha*

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## INTRODUCTION

Food is one among the basic necessities of life along with air and water. Both in the modern medical science and in Ayurveda it has been given much importance. It is the source of energy for all living beings. The father of modern medicine Hippocrates said that proper food can even cure diseases. In Ayurveda food is one among the *trayopasthambha*<sup>[1]</sup> (pillars of life). This importance of food is reflected in the tremendous impact it has on the health of a person even with a slight change in its quality. In Ayurveda it is told that food is reason for both the nourishment of living body and its diseases<sup>[2]</sup>. Thus it is important that you watch what you eat.

In today's world where all things in life have been globalized and commercialized, food is no exception. Food is produced in some part of the world, processed in another and used in a completely different part of the world. The addition or deletion of substances in food items have made it hazardous to the same body that it nourishes. This intentional or unintentional change in the quality is called adulteration. Thus for the safety of the food each country now has their own standards and also governing bodies to ensure that all the products comply with the set standards. Even in Ayurveda there are references of the food having harmful effects on body, be it due to

addition of poisonous substances or due to improper combination. One among such concepts is the concept of *garavisha*. It is a type of artificial poisoning where there is poisonous effects due to addition of substances, mostly intentionally.

In India during the period from 2008 to 2014 on an average 13% of food consumed, was found to be adulterated with a conviction rate of mere 27 %<sup>[3]</sup>, causing mild to severe health problems. The ancient knowledge in Ayurveda can be used to counteract the negative health effects due to the inferior quality of food now a days. Here in this study an attempt has been made to understand the Ayurvedic perspective of food adulteration and find ways of effective management of the health hazards through it.

### Food Adulteration

"Adulteration" is a legal term meaning that a food product fails to meet federal or state standards. It is an addition of another substance to a food item in order to increase the quantity of the food item in raw form or prepared form, which may result in the loss of actual quality of the food item<sup>[4]</sup>. These substances may be other available food items or non-edible items. It can also be any deletion or replacement of an essential constituent of the food item.

Adulteration can occur at any stage of its production like collection, storage, packing,

processing, transport etc. Even though there are no fixed global guidelines for what comes under the purview of adulteration, but some common specifications are seen. It can be considered as adulteration if<sup>[5]</sup>

- It originally bears or contains or has been added with any poisonous or unwanted or deleterious substance accidentally during collection, e.g., sand, stones, same drug of inferior quality, argemona seeds with mustard, mercury in sea food.
- Its container is composed, in whole or in part, of any substance which may render the contents injurious to health, e.g., tin cans, aluminum foils.
- It bears or contains a pesticide chemical residue that is unsafe. e.g., most fruits and vegetables have residual pesticide or insecticide.
- It bears or contains an unsafe food additive or coloring additive.
- e.g., methylene yellow color in sweets
- It has been prepared, packed, or held under unsanitary conditions (insect, rodent, or bird infestation) e.g., may cause infestation, animal droppings in food
- It has been irradiated and the irradiation processing was not done in conformity with a regulation. e.g., packed food items radiated as preservation method
- It contains a dietary ingredient that presents a significant or unreasonable risk

of illness or injury. e.g., starch in milk products

- A valuable constituent has been omitted in whole or in part or replaced with another substance. e.g., cloves which has already been drained of their volatile oils mixed with good ones
- Damage or inferiority has been concealed in any manner. e.g., coloring fruits to look fresh.
- A substance has been added to increase the product's bulk or weight, reduce its quality or strength, or make it appear of greater value than it is. e.g., wax coating on apple, brick powder in chili powder.

The adulteration of food thus can be of two types<sup>[6]</sup> viz., intentional (adulteration that is done on purpose mostly for some financial benefit or gain, e.g., addition of brick powder to chilli powder, starch to milk) and incidental (when an addition or deletion of substance happens without any knowledge or intention i.e. by chance, e.g., mixing of argemona seeds with mustard seeds during collection, any biological contamination).

### **Garavisha**

*Agadatantra* (toxicology) is one among the eight limbs of Ayurveda. It is a branch of Ayurveda which deals with different types of poisons. The poisons are divided mainly into three types based on their origin as *sthavara* (plant origin), *jaangama* (animal

origin)&*krutrima* (artificial)<sup>[7]</sup>.*Garavishais* a type of artificial poison.

Those poisons that are artificially prepared by the combination of substances for the purpose of creating poisonous effect and those which result in diseases after a period of time are called *garavisha*<sup>[8]</sup>. Another explanation of it says that if for any benefits or gains when women or any servant deliberately gives poison, it is *garavisha*<sup>[9]</sup>. It can be the combination of different body parts of animals or their waste, incompatible medicines or metallic *bhasma*, poisons which are low in potency etc.<sup>[10]</sup>. It can be mainly of two types *savishadravyasamyogakruta* (by the combination of poisonous substances) and *nirvishadravyasamyogakruta* (by the combination of non-poisonous substances)<sup>[11]</sup>.

99The harmful effects of these poisons may be of wide verity based on the properties of the combined substances. A list of common symptoms and diseases that are produced as a result of *garavisha* are described in its context. They include *panduta* (anemia), *krushata* (leanness/malnutrition), *alpagni* (weak digestive power), *kasa* (cough), *shwasa* (asthma/respiratory diseases), *jwara* (fever/infections), *ardita* (facial palsy/paralysis), *vayupratilomagati* (neurological symptoms), *atichinta* (anxiety), *mahodara* (ascites), *yakrutroga* (liver disorders), *pleeharoga* (spleen

disorders), *deenavak* (weak voice), *durbala* (reduced body strength), *alasa* (lassitude), *shopha* (edema), *satataadhmana* (blotted abdomen), *shushkapadakara* (dry hands and feet), *kshaya* (emaciation), specific mental symptoms viz typical dreams and delusional symptoms etc.<sup>[12]</sup>. It can be administered in different ways called as *garavishaadhishtahna*. Eighteen such *adhishtana* are described, one among which is *annapaana* (food and drinks)<sup>[13]</sup>. Thus the symptoms of consumption of *vishayuktaannacan* also be considered here like *jihwajadya* (numbness of tongue) *moorcha* (fainting), *chardi* (vomiting), *atisara* (diarrhea) and so on<sup>[14]</sup>.

The main treatment modalities of *garavisha* are *vamana* (emesis therapy), *agnideepana* (carminatives to increase the digestive power), *pathyabhojana* (proper food) and *hrudayavarana* (protective covering of heart) and different antidotes<sup>[15]</sup>.

## DISCUSSION

The food adulteration can be correlated to the concept of *garavishain* Ayurveda in different angles. Considering the explanation given for both the concepts, it can be seen that there is a combination of different substances in both cases, be it intentional or incidental. Just like there is the emphasis on the intentional adulteration for monetary gains or other benefits, Ayurveda

also talks about deliberate poisoning for specific gains with the use of the phrase *soubhagyaartha*<sup>[8]</sup> in the definition of *garavisha*. Even the word *garaartha*<sup>[7]</sup> by *Cakrapani* shows the deliberate nature of the poisoning which can also be seen as corresponding to intentional adulteration.

In Ayurveda a mode of *garavishais* said to be the addition of any body parts or waste products of any living beings *nanapraniangaamsa mala*<sup>[9]</sup>. When there is any biological contamination of food in the form of microbes, fungus, insect body parts, waste products of rodents etc it is also coming under the purview of adulteration. Similarly the term *virudhhaoushadhibhasma*<sup>[9]</sup> may refer to the addition of unsafe organic matter like poisonous plant parts and the metallic contamination in the modern view of adulteration and the term *alpaveeryavisha*<sup>[9]</sup> may be correlated to poisonous substances in the form of chemical additives, preservatives, pesticides etc.

While looking into the types of *garavishait* can be seen that they are either

due to the combination of poisonous substances or non-poisonous substances, it is the similar case with adulteration of food. There can be adulteration with poisonous substances like heavy metals, chemical colouring agents, pesticide residue etc. or with non-poisonous substances like water, starch, stones, same substance with inferior quality etc.

The effects of food adulteration on the health of an individual depend upon many factors like the type of adulterant, period of exposure, extent of adulteration etc. Even so there can be some symptoms or diseases that occur commonly due to consumption of adulterated food. Even in Ayurveda there is a list of such diseases that are caused due to *garavisha*. While comparing these two it can be seen that there are many similarities in both sides. Table 1 shows a list of some diseases due to *garavisha* and the similar health effect according to modern studies of food adulteration and the few examples of adulteration in which they are seen.

**Table 1. *Garavisha* symptoms, similar health effects of adulteration and a few examples**

<u><i>Garavishalaksana</i></u>	<u>Health effect</u>	<u>Adulteration</u>
<i>Pandu, Kshaya, Dourbalya, Karshya</i> <sup>[13]</sup>	Anemia, Malnutrition	Chalk powder – flour, Brick powder – chilli powder

<i>Alpagni, Adhmana</i> <sup>[13]</sup>	Stomach disorders	Unhygienic water- milk, Chichori powder – coffee Molasses sugar - Honey
<i>Mahodara , Yakrutroga</i> <sup>[13]</sup>	Liver disorders	Mineral oils and karanja oil – Edible oil Papaya seed powder - pepper powder
<i>Sopha</i> <sup>[13]</sup>	Dropsy, Cancer	Argemone seed – mustard , Methyline yellow – turmeric
<i>Ardita</i> <sup>[13]</sup>	Neurological disorders	Kesari dal – other dal (Lathyrism)
<i>Jwara</i> <sup>[13]</sup>	Infections	Unhygienic packing , microbial adulteration , milk
<i>Swasa , Kasa</i> <sup>[13]</sup>	Infections and allergy	Unhygienic packing , microbial adulteration ,
<i>Chardi* , Atisara*</i>	Vomiting , Diarrhea (Due to Infection also)	Washing soda – jaggery Foreign resin – asafetida Tamarind seeds - coffee
* <i>savishaannasevanalakshana</i> <sup>[14]</sup>		

## Prevention

The prevention of adulteration of food is the best way to maintain the health of the country. Food adulteration can not only be a result of need for quick profit but also can result from shortages and increased prices, consumer demand for verity in food, lack of awareness, negligence, indifference and lethargy among customers and inadequate enforcement of food laws and food safety measures. It can be adulteration as a whole or

its consumption can be prevented by proper governing body to ensure food safety, formulation of proper legislation and their implementation, by public awareness about the common adulterated food, their ill effects and proper testing methods of susceptible food items.

In India the food safety is ensured by the Food Safety and Standards Authority of India (FSSAI) governed by the Ministry of Health and Family Welfare. The FSSAI

implements and enforces food regulations as prescribed in the Food Safety and Standards Act, 2006 (FSS Act). According to the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulation, 2011, it is mandatory for all food businesses operators, manufacturers, importers, distributors, wholesalers, retailers, hotels, restaurants, eateries, as well as petty food businesses to have an FSSAI registration/license so they are in compliance with the FSS Act. Consumers are urged to buy only those foods which have the FSSAI mark on them proving their safety and eat outside only in establishments having a FSSAI license or registration.

The common people can protect themselves from the hazards of adulteration by being conscious of what they buy and eat. Testing foods that are commonly adulterated for their purity before consumption is a very effective way of preventing health hazards. The FSSAI has also brought out some simple tests to be performed on common food items to test for their purity. A few easy tests are:<sup>[16]</sup>

- **Milk for detergent** – shake 5-10 ml of milk with same amount of water, formation of lather indicates presence of detergent.
- **For synthetic milk** – has a soapy feeling on rubbing between fingers and turns yellowish on heating
- **Milk and milk products like khoa for starch** – boil with water, allow it to cool and add iodine solution if it turns blue there is starch.
- **Coconut oil for other oils** – keep oil in refrigerator, pure coconut oil will solidify leaving the adulterant.
- **Sugar for chalk powder or plastic sugar**– dissolve a little quantity in water, chalk powder or plastic will not dissolve.
- **Sugar for urea** – dissolve a little quantity of sample in water smell of ammonia shows presence of urea.
- **Honey for added sugar** – put a drop of sample honey into a beaker of water, if it does not disperse in water it is pure
- **Cereals and pulses for ergot fungus** – put some sample grains into a beaker containing 20% salt solution, the fungus will float and grains will settle down.
- **Atta, Rava etc for iron filings** – by moving a magnet through the sample.
- **Black pepper seeds for papaya seeds** – put some sample in rectified spirit, the black pepper will sink and papaya seeds will float.
- **Turmeric whole for lead chromate for colour**– leaves colour on washing
- **Chilli and turmeric powder for artificial colouring**– sprinkle the powder on top of a beaker of water, the artificial colour descends as colourful streaks.

- **Asafoetida for impurities** – when burnt if it burns like camphor then it is pure.
- **Cumin seeds for grass seeds covered with charcoal dust** – rub the sample on the palm, if the palm turns black it is adulterated.
- **Artificially coloured vegetables and pulses** – mix in water and keep for half hour, the colour will be there for water also.
- **Coffee powder for chicory powder** – sprinkle the sample on a beaker of water the coffee will float and chicory powder will sink leaving a trail of colour.

### Management

The management of the harmful effects of food adulteration is dependent on the type of adulterant and period of exposure. Even so, the steps of management can be broadly divided under the main headings like removal of toxins, prevention of further exposure, management of symptoms and rehabilitative food and life style. Even in Ayurveda the treatment principles of *garavisha* follow a similar line of management.

The first and foremost thing to be done when there has been a confirmed ingestion of adulterated food is to find out ways to expel out the harmful substance from the body. In cases of acute poisoning symptoms it is relatively easy to do so due to the fact that the adulterant has been detected soon and it is in a considerable amount. The

removal can be done effectively by methods like stomach wash or *sadyovamanain* ayurveda. In case chronic exposure on the other hand it is difficult to remove the toxins that are diffused in the body tissues. Here the classic ayurvedic therapeutic procedure of *vamana* can be of good results because it helps to remove the toxins from all parts of the body.

Once the toxins are removed, the prevention of further exposure is very important. This can be done by eating food that are standardized, safe, organic etc. The advice of *pathyabhojanaby* the ancient scholar may have been given keeping this in view. Eating wholesome food not only prevents further exposure but also acts as an aid to repair the damage done by the adulterated food. The *pathyabhojana* concept can also account to the rehabilitative food and lifestyle suggested in the modern concept of food adulteration.

Management of symptoms is mainly by the use of different antidotes and medicines. In Ayurveda the medicines given come under the concept of *shaman chikitsa* and the specific antidotes given in case of poisoning are called as *agada*. Many different formulations and *agada* have *garavisha* among their indications. The appropriate formulation is to be selected on the basis of the symptoms and the *dosha* involved. Some common formulations are

*Kaivishapariharigulika*, *Dooshivishariagada*, *Vilwadigulika* etc. The use of *tapyandswarnachornain* the form of *lehamade* with honey and sugar is said to cure even sever case of *garavisha*<sup>[17]</sup>. One of the main symptoms that can pave way for many other symptoms in most cases of food adulteration is the hampering of the digestive power. *Murvadichoorna* taken with an *anupana* of buttermilk, luke warm water, whey or any sour juice is indicated in this condition<sup>[18]</sup>.

Ayurveda also has a unique technique to protect the heart from being affected in case of poisoning called the *hrudayavarana*. It is the administration of *swarnachoorana* (fine purified powder of gold) internally to person after he has undergone the purificatory therapy. *Vamana* is done to purify the body followed by the internal administration of very fine purified copper powder with honey for the purification of *hrudaya*<sup>[19]</sup>. After the *hrudaya* is purified the purified powder of gold is given. The smiley of lotus leaf is used while saying the benefits to explain that the poison will not stick to the part treated with gold just like water on lotus leaf. It also provides longevity and is indicated in *garavisha*<sup>[20]</sup>

### Conclusion

Food is essential for sustenance of life; any degradation in its quality can lead to grievous health effects. Advent of science of food marketing and globalization has increased the cases of food adulteration

affecting a large number of people at a time. In some instances the effects of adulterated food are no less than that of poison. Thus it can be correlated to the concept of *garavishain* Ayurveda. This can help in the effective ayurvedic management of the health hazards of adulteration by the judicious use of purificatory therapies and antidotes. Common people should also be aware about identification and health hazards of adulteration. Proper legislation and its enforcement on the safety of food in all stages i.e., from farm to table, are very important for the health of the country.

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