



# Herbal Drug Adulteration: A Hindrance to the Development of Ayurveda Medicine

Dr. D.B. More<sup>1</sup>, Pranali S. Giradkar<sup>2</sup>

<sup>1</sup>Assistant Professor (Dravyaguna),

<sup>2</sup>PG Scholar (Dravyaguna), Government Ayurvedic College, Osmanabad, Maharashtra. 413501

## Abstract

Ayurveda has gained popularity in recent years. People have developed an interest in traditional medicine due to the side effects of synthetic drugs. Herbal drugs being the base of traditional medicine and are useful in medicine and cosmetics preparations. With the increase in demand of herbal preparations malpractice and problem of adulteration is also increased. Adulteration is both accidental and intentional. Accidental adulteration is due to wrong identification of drug, whereas intentional adulteration is to earn more profit. Among these intentional adulteration is more troublesome regarding the safety issue. Examples are Japanese ginger (*Zingiber mioga*) used to adulterate medicinal ginger (*Zingiber officinale*), *Kampillaka* powder is adulterate with brick powder etc. Extinction of many species due to deforestation and incorrect identification of plants are the main reason for adulteration. Adulteration of herbal drug has become hindrance to the further development of Ayurveda medicine. It affect the trust of people in Ayurveda medicine by reducing the efficacy of drugs. Hence this paper is an attempt to understand all the ways of adulteration and different measures to overcome these problems thereby, farmers of our country will get economic benefit by cultivating original species which will help to increase the safety of herbal preparations.

**Keywords:** Adulteration, Ayurveda, Herbal drugs, Safety issue.

## Introduction

Ayurveda has gained popularity in recent years. People have developed faith in ayurvedic medicine, most of the ayurvedic preparations are herbal drug based and they have less or no side effects as compare to synthetic drugs. With the increase in interest and demand of herbal drug problem of malpractices is also increased. Among which adulteration has become burning issue for herbal industry.

Adulteration can be accidental or intentional. Accidental adulteration occurs due to wrong identification of drug, where Intentional adulteration is more troublesome and sometimes it may be dangerous for health. Adulteration in herbal drug is responsible for decline faith in traditional medicine. But most of the time it is found that reported adverse effects of herbal preparation is due to the presence of spoiled and inferior adulterant and not of original drug. The deforestation and extinction of many plant species is result into scarcity of plants and are responsible for adulteration, hence conservation of biodiversity, protection of forest and increase in agriculture practices are the measures to overcome adulteration.

## Current scenario of medicinal herbs[1]

- According to WHO, present demand for medicinal plants is \$14 billion a year and by the year 2050 it would be \$5 trillion.
- In India about 25,000 plant based formulations are used in traditional and folk medicine.

- More than 1.5 million practitioners are using the traditional medicinal system.
  - More than 7800 manufacturing units are involved in the production of natural health products. Which requires more than 2000 tons of a medicinal plant raw material annually.

This paper is an attempt to encourage people for cultivation of endangered plant species. The development of advance agriculture practices and educating people about correct identification of drugs can help to get rid of adulteration. Cultivation and agriculture practices also help to generate income sources for social units in developing countries.

### **Material and Method**

- Study of herbal drug adulteration from various authenticated books.
- Study of herbal drug adulteration from previous work done published in research papers and articles.

### **Discussion**

#### **Adulteration[2]**

- ❖ A practice of substituting the original crude drug partially or fully with other substances which is either free from or inferior in therapeutic and chemical properties.
- ❖ Addition of low grade or spoiled drugs or entirely different drug similar to that of original drug substituted with an intention of enhancement of profits.

#### **There are two ways of adulteration[3]**

- ❖ **Direct or Intentional adulteration-** It is mostly done by the suppliers for enhancement of profit. Addition of harmful or inferior drug decreases the safety value of drugs.
- ❖ **Indirect or Unintentional adulteration-** This type of adulteration occurs without any bad intention due to incorrect identification of drugs.

A drug is consider as adulterated if does not meet the prescribed standard because of substitution, deterioration, admixture, sophistication, inferiority and spoilage. These are also the methods of adulteration.

[4]

#### **1. Substitution**

Replacement of some part of original drug with morphologically similar but chemically and therapeutically inferior drug.

#### **2. Deterioration**

It is an impairment of the quality or value of substituents due extraction of the constituents or volatile oils and sale of residue as original drugs.

#### **3. Admixture**

It is the addition of one article to another through accident, ignorance or carelessness.

#### **4. Sophistication**

The substituents which look morphologically similar and superior than the original drug is added to improve the appearance.

#### **5. Inferiority**

It is the condition where a drug is added whose natural constituent is below the minimum standard for that particular drug.

It can be avoided by careful selection of the drugs.

## 6. Spoilage

It is the substandard condition of drug produced by attack of microbes and which makes product unfit for consumption.

It can be avoided by proper drying and storage of products.

### Reasons for adulteration [5]

#### 1. Scarcity of drug

Tremendous increase in population leads to the increase in demand of herbal raw material. The limited natural resources, over explosion and less cultivation of medicinal plants leads to the scarcity of medicinal plants.

Ex. *Kutaki, Jivanti*

#### 2. Confusion in vernacular names

More than one plant having same synonyms and confusion in vernacular name will result into adulteration.

Ex. *Amruta* is common synonym of *Guduchi (Tinosporacordifolia)* and *Haritaki (Terminaliachebula)*

*Samanga* is synonym of both *Lajjalu and Manjishtha (Rubiaccordifolia)*

#### 3. Lack of knowledge about authentic source

Drugs that are used extensively as medicinal agent in folk but do not have description in authenticated books are consider as *AnuktaDravya*. Due to lack of knowledge and authentic sources of such drugs result into adulteration.

Ex. *Somalatha (Sarcostemmaacidum)*

#### 4. Similarity in Morphology

Drugs which looks morphologically similar are commonly adulterated.

Ex. Seeds of *Vruddhadaru* adulterated with seeds of *Plaksh*.

Bark of *Arjuna* is adulterated with bark of *Ashoka*

#### 5. Unscientific collection

Raw material required for big pharmacy or drug retailer is generally collected by local and uneducated person from field and forest. These persons are not qualified botanist or taxonomist who can identify and authenticate correct species of herb. This careless collection usually admixed the plants.

Ex. *Desmodiumtriquetrum* is collected in place of *Desmodiumgangaticum*

Useful part of *Bhrungaraj, Bharangi* is root but in market sample whole plant parts are found.

#### 6. High price of the drug in the market

Drugs having higher cost are commonly adulterated with relatively low cost drug for more profit.

Ex. Stamens of *Nagkesara* is adulterated with stamens of *Punnag* and *Surangi*.

#### 7. Substitution

In *BhavprakashNighantu Acharya Bhavprakash* has explained about the *PratonodhiDravyas (Substitution)*. Due to unavailability of particular drug another substitute having similar therapeutical properties can be used.

Ex. *PratinidhiDravya* of *Ashta-varga*[6]

Sr. No.	Ashta- vargaDravya	PratinidhiDravya
1	<i>Meda-Mahameda</i>	<i>Shatavari</i>
2	<i>Jivaka-Hrishbhaka</i>	<i>Vidarikanda</i>
3	<i>Kakoli-Kshirkakoli</i>	<i>Ashwagandha</i>
4	<i>Hrididhi-Vruddhi</i>	<i>Varahkanda</i>

## Type of adulteration

### 1. Substitution with Superficially Similar Inferior Drugs[7]

The drug which morphological resemble to the authentic drug but inferior in chemical or therapeutic potential is used as adulterant.

Examples-*Kuchala*(*Strychnosnuxvomica*) is adulterated with *Kataka* (*Strychnopotatorum*)(Fig 1), *Adraka* (*Zingiberofficinalis*) is aduiterated with Japanese Ginger (Fig 2)



**Fig 1:***Kuchala*(*Strychnosnuxvomica*)*Kataka* (*Strychnopotatorum*)

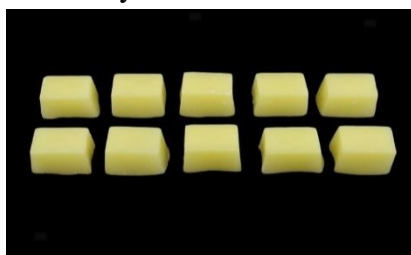


**Fig 2:***Adraka* (*Zingiberofficinalis*)*Japanese Ginger*

### 2. Substitution with Artificially Manufactured Substance[7]

Artificially prepared drugs by providing the general form or appearance like original drugs are used as substituent of the original one.

Examples-Paraffin wax after yellow coloration substituted for bees wax.(Fig 3)



**Fig 3:** Paraffin Wax



Bees Wax

### 3. Substitution with Exhausted Drug[7]

After extracting the chemical constituents the residue or exhausted form of drug is sale as original one. Due to this the plant material loses its medicinal properties. This practice is common in case of drugs containing volatile oils. This type of fraud is done for the enhancement of profit.

Ex. *Jiraka* (*Cuminumcyminum*) (Fig 4), *Lavanga* (*Syzygiumaromaticum*)



**Fig 4:** *Jiraka* (*Cuminumcyminum*)

#### 4. Substitution with Synthetic Chemicals to Enhance Natural Character[3]

Synthetically prepared drugs are added to the original one to enhance natural characters.

Ex. Citral oil is mineral oil added to the natural citrus oil present in lemon or orange.(Fig 5)



Fig 5: Citral oil

Citrus oil

#### 5. Presence of Vegetative Matter of Same Plant[8]

Along with the useful part other vegetative parts of same plant or other plant is added to the original one. It can occur due to negligence or carelessness during collection of plants.

Ex. Stem portion the plant *Bala (Sidacordifolia)* is added along with leaf.(Fig 6)

Clove is mixed along with leaf and petioles.



Fig 6: *Bala (Sidacordifolia)*

#### 6. Harmful Adulterants[7]

Sometimes waste form of drug which may be harmful for health is added to authentic drug.

Ex. White oil in coconut oil

Argemone seed in Mustard seed. (Fig 7)



Fig 7: Mustard seed Argemone seed

#### 7. Adulteration of Powders[7]

This type of adulteration is commonly done in powder form of drug to decrease its cost by increasing weight.

Ex. Brick powder mixed with Kampillaka powder. (Fig 8)

Wheat flour mixed with Shunthi powder.



**Fig 8:** Kampillaka powder

Brick powder

### Disadvantages of Adulteration

- Adulteration is one of the greatest drawback in promotion of herbal products.
- Adulteration can cause deterioration and degradation of products.
- It can cause denaturation of product and may destroy the active constituents of drugs
- It leads to increase in cost of products.
- Efficacy of drug is reduced or it may take longer time to show its action.
- It can alter the dosage form and nature of drugs.
- It can produce adverse effects.

### Measures to overcome adulteration[9]

Adulteration can be overcome with the help of following methods of evaluation-

#### ◆ Morphological or Organoleptic test

It is quantitative type of evaluation by studying macroscopic characters of drugs. The morphological and organoleptic evaluation can be done with the help of sense organ. Drug can be identified by colour, odour, size, shape, fractures and texture.

Ex. Granular fracture over the bark of Kutaja (*Holarrhena antidysentrica*)

Aromatic odour of *umbeliferous* fruits

#### ◆ Microscopic evaluation

Identification of drug with the help of microscope by taking transverse and longitudinal sections to examine their histological characters, like stomata, calcium oxalate crystals, starch grain etc. It is quantitative evaluation of crude drugs in entire form and powder form.

Ex. Starch and hemicellulose is identified by blue colour with iodine solution.

All lignified tissue give pink stain with phloroglucinol and HCL.

#### ◆ Chemical evaluation

Active chemical constituents can be identified by chemical evaluation with the help of chemical tests and chromatography. Chemical evaluation is helpful for isolation, purification, identification of active constituents.

#### ◆ Physical evaluation

Physical properties of drug are helpful for detection of active components in plants.

Ex. Moisture content, specific gravity, ash value, viscosity etc.

### ◆ Biological evaluation

Medicinal plants contain active constituents by which they show specific biological and pharmacological activity. Their pharmacological activities can be utilized for their evaluation. It is also helpful to carry out In-vitro and In-vivo studies.

Ex. Anticancer activity, anti-microbial activity, hepato-protective activity etc.

We can also overcome from the problem of adulteration by developing agriculture and post harvesting practices. Educating people about the conservation and protection of biodiversity and plant resources. By involving more people for adopting cultivation of medicinal plants and creating market link inside and outside the state for their sale will also help to generate income resources for families in developing countries.

### Conclusion

Adulteration is a burning problem of present era. It has become a hindrance to the development of Ayurveda as it is one of the greatest drawbacks in promotion of herbal products. Adulteration is the addition of spoiled, spurious, inferior or entirely different drug to that of original drug with an intention of enhancement of profits. It can be accidental or intentional. Where intentional is more troublesome. Correct identification of plants, conservation of biodiversity and cultivation of endangered medicinal plants are the measures to overcome from adulteration.

Involving more people in cultivation practice can become economically beneficial for country and provide income sources for social units.

### References

1. Aneesh, et al.: International market scenario of traditional Indian herbal drugs, *International Journal of Green Pharmacy*, July-September 2009.
2. Mukherjee K Pulok "Quality Control of Herbal drugs" *Business Horizons*, New Delhi. 1st edition 2002: pp 113-117
3. Poornima B. Adulteration and substitution in herbal drugs a critical analysis, *IJRAP*. 2010; 1(1):8-12.
4. *Material medica* book
5. Sarin YK. *Illustrated Manual of Herbal drugs used in Ayurveda*, Joint Publication of C.S.I.R and I.C.M.R, New Delhi. 1996
6. Bhisgratnashreebhramhasankarmishrashastri, *Bhavprakash Samhita* (Hindi translation), Vranasi; Chaukhamba Sanskrit Bhavan; ISBN 81-86937-44-7 (Vol.I), p.182.
7. Neelam et al.: Adulteration and Substitution of Medicinal Plant: A Burning Problem in Herbal Industry, *International Journal of Pharmaceutical & Biological Archives* 2014; 5(3): 13 – 18
8. Kokate CK, Purohit AP and Gokhele SB: *Pharmacognosy*. 2007. Chapter-6. Nirali Prakashan; 39<sup>th</sup> Ed:97-98.
9. Dr.Sreelekshmi M, et al.: Drug adulteration: A threat to efficacy of ayurveda medicine, *Journal of Medicinal Plants Studies* 2017; 5(4): 01-06