

Adulteration of Herbal/Crude Drugs

**GALGOTIAS
UNIVERSITY**

Disclaimer

All the content material provided here is only for teaching purpose.

GALGOTIAS
UNIVERSITY

DEFINITION

- **Adulteration is a practice of substituting original crude drug partially or whole with other similar looking substances but the latter is either free from or inferior in chemical and therapeutic properties.**

OR

GALGOTIAS
UNIVERSITY

- Adulteration in simple words is the debasement of an article.

OR

- Adulteration is broadly defined as admixture or substitution of original or genuine article/ drug with inferior, defective or otherwise useless or harmful substances.

GALGOTIAS
UNIVERSITY

- **ADULTERANT :**

The adulterant must be some material which is both cheap and available in fairly large amounts.

TYPES OF ADULTERATION

- 1. Deliberate (Intentional) adulteration
- 2. Accidental (In-deliberate) adulteration
- Deliberate adulteration – Are normally commercial mainly with the intention of enhancement of profits

REASONS FOR ADULTERATION

- **1. Scarcity of the drug**
- **2. The high price of the drug in the market, eg: Clove, Cinnamon, Cardamom**
- **3. It is very common with the contraband drugs e.g. Opium**

- The term 'adulteration' or debasement of an article covers a number of conditions, which may be **deliberate** or **accidental**.

GALGOTIAS
UNIVERSITY

- **Inferiority** is a natural substandard condition (e.g. where a crop is taken whose natural constituent is below the minimum standard for that particular drug) which can be avoided by more careful selection of the plant material.

- **Spoilage** is a substandard condition produced by microbial or other pest infestation, which makes a product unfit for consumption, which can be avoided by careful attention to the drying, and storage conditions.

- **Deterioration** is an impairment of the **quality or value** of an article due to destruction or abstraction of valuable constituents by bad treatment or aging or **to the deliberate extraction of the constituents and the sale of the residue as the original drugs.**

- **Admixture** is the addition of one article to another through accident, ignorance or carelessness e.g. inclusion of soil on an underground organ or the co-collection of two similar species.

- **Sophistication** is the deliberate addition of spurious or inferior material with **intent to defraud**; such materials are carefully produced and may appear at first sight to be genuine **e.g. powder ginger may be diluted with starch with addition of little coloring material to give the correct shade of yellow colour.**

- **Substitution** is the addition of an entirely different article in place of that which is required e.g. supply of cheap cottonseed oil in place of olive oil.

TYPES OF ADULTERATION OR SUBSTITUTION OF HERBAL DRUGS

- **Different methods used for adulteration may be grouped as follows:**
 1. **Substitution with Inferior Commercial Varieties**

Due to morphological resemblance to the authentic drugs, different inferior commercial varieties are used as adulterant **which may or may not have any chemical or therapeutic potential as that original natural drug**

- E.g. Arabian Senna (*Cassia angustifolia*) and dog Senna (*Cassia obovata*) have been used to adulterate Senna (*Cassia senna*)
- E.g. Japanese ginger (*Zingiber mioga*) to adulterate medicinal ginger (*Zingiber officinale*).

2. Adulteration by Artificially Manufactured Substitutes

To provide the general form and appearance of various drugs, **some materials are artificially manufactured and are used as substitute of the original one.** E.g. artificial invert sugar for honey; paraffin wax after yellow coloration substituted for bees wax.

3. Substitution by Exhausted Drugs

Here the same plant material is mixed which **is having no active medicinal components as they have already been extracted out.** This practice is most common in case of volatile oil containing materials like clove, fennel etc.,

- where the dried exhausted material resembles the same like original drug (similarly with drugs like *Cascara sagrada* and ginger). Sometimes when coloring matters have been extracted or removed during exhaustion, the residue is re-colored with artificial dyes as is done with saffron and red rose petals.

4. Substitution by Superficially Similar but Cheaper Natural Substances

Usually here the adulterated product has no relation with the genuine article, **may or may not have any therapeutic or chemical component desired,**

- e.g. leaves of species - *Ailanthus* are substituted for belladonna, senna, mint etc.; Leaves of *Phytolacca* and *Scopolia* for belladonna; Leaves of *Xanthium* for *stramonium* and dandelion for henbane; Indian dill with European dill or caraway etc.

5. Adulteration by Addition of Worthless Heavy Materials

A large mass of stone mixed with Liquorice root, pieces of limestone are found in asafoetida and lead shot has occurred in pieces of opium etc.

6. Addition of Synthetic Principles

Sometimes to fortify inferior natural products, synthetic principles are added e.g. adding citral to oil of lemon; benzyl benzoate to balsam of Peru etc.

7. Usage of Vegetative Matter from the Same Plant

This is done by mixing adventitious matters or naturally occurring with the drug in excessive amount or parts of plant other than that which constitutes the drugs.

- For example liver warts and epiphytes growing in bark portion are mixed with Cascara or Cinchona; stems of buchu are sometimes cut into short lengths and added to the drug.

- **Several factors are to be considered for the detrimental effects on the stored products.**

GALGOTIAS
UNIVERSITY

References:

1. T.E.Walis, Textbook of pharmacognosy, 5th edition, published by CBS Publisher & Distributor,p.no.561
2. Protocol for testing ayurvedic, siddha & unani medicines, Pharmacopoeial Laboratory For Indian Medicine Ghaziabad ,p.no.94,135-146
3. Rasheeduz zafar et al, practical pharmacognosy, 1st edition reprint 2000, published by CBS publisher & distributor, new delhi p.1
4. Mohhamad Ali , textbook of pharmacognosy, second edition 1998, published by CBS publisher p.n.52
5. Khandelwal K.R, Practical Pharmacognosy Technique & Experiment, published by Nirali Parkashan ,p.no.146
6. T.E.Walis, Textbook of pharmacognosy, 5th edition, published by CBS Publisher & Distributor,p.no.561
7. Dr.C.K.Kokate et al, 39th edition, Pharmacognosy, published by Nirali Parkashan, 20th edition 2004, p.no.
8. S.S Handa, Textbook of Pharmacognosy, 2nd edition reprint 2005, Vallabh Prakashan delhi p.no.63
9. DR.C.K.Kokate, Practicle Pharmacognosy, 4th edition, reprint 2006, published by Vallabh Parkashan delhi,p.no. 122