

ADULTERATION

B.PHARM 4TH SEM

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INTRODUCTION

The adulteration and substitution of herbal drugs is the burning problem in herbal industry and it has caused a major effect in the commercial use of natural products. Adulteration in market samples is one of the greatest drawbacks in promotion of herbal products.

Adulteration it is 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 or 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.

An adulteration means a process of addition of impure, cheap and filthy substances to genuine drug in order to get more profits . The adulterants may not have pharmacological or therapeutic properties.

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

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.

ADULTRANT

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

1. Deliberate (Intentional) adulteration
2. Accidental (In-deliberate) adulteration
3. Deliberate adulteration - Are normally commercial mainly with the intention of enhancement of profits
4. Scarcity of the drug
5. The high price of the drug in the market, eg: Clove, Cinnamon, Cardamom
6. It is very common with the contraband drugs e.g. Opium

Reasons for Adulteration

- * Confusion in vernacular names.
- * Lack of knowledge about authentic sources.
- * Similarity in Morphology.
- * Lack of authentic plants.
- * Unscientific collection.
- * High price of the drug in the market.
- * With the intention of enhancing profits.

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

Inferiority-

*Replacement with substandard drug. Natural substandard condition, where a crop is taken whose natural constituents is below the minimum standard for that particular drug.

*Adulterants resembles the original crude drug morphologically, chemically, therapeutically but are substandard in nature and cheaper in cost.

*Examples:

**Strychnos nux-vomica* adulterated with *Strychnos potatorum*,

*Indian senna adulterated with Arabian-senna,

**Zingiber officinalis* adulterated with Japanese ginger,

**Solanum xanthocarpum* adulterated with *Solanum mammosum*.

*It can be avoided by more careful selection of plant material,

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-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-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-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-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

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.


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 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.