



ADULTERATION AND SUBSTITUTION OF CRUDE DRUGS

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ABSTRACT

Herbs are one of the effective sources of Ayurvedic & other traditional medicine as well as modern medicine. Sharangdhara Samhita (an ancient Ayurvedic literature in 1300 AD.) Introduce the concept of “polyherbal” which comprises combined herbal drug formulation with another ingredient. Polyherbal formulations were used to cure various human ailments from many centuries. These are a collection of various herbs & minerals that are processed to detoxify its toxicity and thus act as medicine which is used therapeutically. In today’s scenario where whole world is looking towards Ayurveda & Ayurvedic medicines for the treatment of ailment the treatment of the disease, this increases the demand for raw materials exponentially. However, production growth is still linear and is not sufficient to fulfil the required demand. Rapid depletion of natural resources creates major problems and also a big reason for adulteration & substitution. This Adulteration & substitution are a burning problem in Ayurvedic Pharmaceutical industry that threatens the integrity of Ayurvedic system of medicine. Therefore, an understanding of all way of adulteration & substitution is needed. This will be discussed in detail in the full paper along with rules & regulations mentioned in Drug & Cosmetic act and the rules between 1940 & 1945 to amend this illegal act and maximize consumer safety.

Keywords: Adulteration, substitution, Drug & Cosmetic act

INTRODUCTION

Medicinal plant constitutes an effective source of traditional (e.g., Ayurvedic, Siddha, Unani) and modern medicine. Herbal medicine has been shown to have authentic benefit. In India, about 80% of rural population depends on medicinal herbs and endemic system of medicine. In today's era approx. 70% of synthetic medicine are derived from plant. In herbal adulteration is one of the common corruptions in herbal raw-material substitute. Adulteration is described as intentional substitution with another plant species or intentional addition of a foreign substance to increase the weight or potency of the product or to decrease its cost. Substitution is replacement of equivalent drugs in place of original drugs in place of original drugs on the basis of similar pharmacological action and therapeutic uses. These drugs are based on similar *Rasa, Guna, Virya, Vipaka* and mainly the karma. Adulteration and

substitution "Sandigdha Daraya" are a term used for that types of medicinal plants which are mentioned in ayurvedic classics. The term crude drug generally applies to the products from plant and animal origin found in a raw form.

ADULTERATION

Adulteration in market samples is one of the greatest drawbacks in promotion of herbal product. Due to adulteration faith in herbal drugs has declined. The term adulteration is defined as substituting original crude drug partially or wholly with other similar in physical appearance substances. Mixing of other matter of an inferior and sometimes harmful quality with food/drink intended to be sold. As a result of adulteration food or drink becomes impure and unfit for human consumption.

Types of adulteration:

Direct or intentional adulteration	Indirect or unintentional adulteration
It is done intentionally which usually includes practices in which an herbal drug is substituted partially or fully with other inferior products.	Unintentional adulteration which sometimes occurs without bad intention of the manufacturer or supplier.
Due to morphological resemblances to the authentic herb, many different inferior commercial varieties are used as adulterants.	Sometimes in the absence of proper means of evaluation, an authentic drug partially or fully devoid of the active ingredients may enter the market.
These may or may not have any chemical or therapeutic potential.	Various factors affect the quality of the drug, such as geographical sources, growing conditions, processing methods, and storage conditions due to which an adulterated drug may enter the market in the lack of proper evaluation means.
Substitution by "exhausted" drugs entails adulteration of the plant material with the same plant material devoid of the active constituents.	Confusion in vernacular name between indigenous systems of medicine and local dialects.
Adulteration using the vegetable part of the same plant.	Lack of knowledge about the authentic plant.
Addition of toxic material.	Similarity in morphology and aroma.

1) Adulteration with artificially manufactured materials: -

This type of adulteration is observed in case of drugs which are costly. Which resemble with various drugs in morphological character as appearance. For example, Nutmeg is adulterated with basswood prepared to the required shape and size. Paraffin wax is tinged

yellow and adulterated with yellow beeswax, while artificial invert sugar is mixed with honey.

2) Adulteration with Superficially Similar but Inferior Drugs: -

Inferior drugs may or may not have any chemical or therapeutic value. They resemble only morphologically. For example, is adulteration of cloves by mother cloves. Saffron with dried flowers of

Carthamus tinctoria (Safflower). adulteration of senna with dog senna.

3) Replacement by Exhausted Drugs: -

Many drugs are extracted on a large scale for the isolation of an active principle, volatile oils, etc. The exhausted material is then used either entirely or in part as a substituent for the genuine drug. For example, umbelliferous fruits and cloves (without volatile oils) are adulterated with exhausted (without volatile oils) original drugs; exhausted jalap and Indian hemp (without resins) are used as adulterants.

4) Addition of toxic materials

In this type of adulteration, the material used for adulteration would be toxic in nature. A big mass of stone was found in the center of a bale of liquorice root. Limestone pieces in colophony, barium sulphate to silver grain cochineal and manganese dioxide to black grain cochineal, are few examples in this adulteration.

5) Adulteration of powders: -

Powdered drugs are found to be adulterated very frequently. Adulterated used are generally powdered waste products of a suitable color and density. Powdered olive stone for bark, red sanders wood to chillies, dextrin for powdered ipecacuanha, are few adulterants.

6) Addition of synthetic principles: -

Synthetic pharmaceutical principle is used for market and therapeutic value. Critical is added to lemon oil, whereas benzyl benzoate is added to balsam of Peru. Apart from these the herbal product labelled to improve sexual performance in men when analyzed, contained sildenafil. Brand names included antra-Rx, Yilishen, Hua for, Vinarol and Vasx, Sleeping Buddha containing estazolam, Diabetes Angel containing glyburide and phenformin are few examples under this category.

Undeliberate adulteration: -

Commonly used adulteration in ASU Drugs

Example of Drugs	Possible Adulterant
Amaltas (Cassia fistula)	Gandh Babool (Vachelia fernaciana)
Arjuna (Terminalia arjuna)	Jarula/Quince's crap myrtle (Adameba glabra Lam.)
Ashoka (Saraca asoca)	Debdaru (Polyalthia longifolia)
Baubadang (Embelia ribes)	Sp. of Baubadang (Myrsine Africana)
Filfil-e-Siyah (Piper nigrum)	Tukhm-e-Papita (Carica papaya)

7) Lack of knowledge about authentic plant sources: -:

Hypericum perforatum is cultivated and sold in European markets. In India, availability of this species is very limited. However, the abundant Indo-Nepal species Hypericum patulum, sold in the name of Arnebia euchromavar.

Indirect or unintentional adulteration: -

1) **Confusion In Vernacular Names: -:** Use of same vernacular name of different species and vice-versa, creates confusion, and invites adulteration. For example, in Ayurveda, Parpatta refers to Fumaria parviflora. In Siddha, "Parpadagam" refers to Mollugo pentaphylla.

2) Lack of knowledge about authentic plant sources: -

Nagakesar is one of the important drugs in Ayurveda. The authentic source is Mesua ferrea. However, market sample are adulterated with flowers of Calophyllum inophyllum. Nagkeshar is available in parts of the Himalayas and the Western Ghats, which makes it challenging to collect.

3) **Similarity in morphology: -:** The drugs which look morphologically similar are generally adulterated. For example, Mucuna pruriensis adulterated with other similar Papilionaceae seeds having similarity in morphology.

4) **Similarity in color: -:** It is a well-known fact that with the course of time, drug materials get changed to or are substituted with other plant species. For example, "Ratanjot." In the past, roots of Ventilago madraspatana, was the only source of "Ratanjot," from the Western Ghats. However, due to the similarity in yielding a red dye, *Arnebia euchroma* var. *euchroma* is the present source.

Ghee	Vanaspati Ghee
Giloe (<i>Tinospora cordifolia</i>)	Powder or flour of potato, sweet potato.
Gum of Guggul (<i>Commiphora wightii</i>)	cheaper gum exudate like goandkateera, Gond Kundur (<i>Boswellia serrata</i>), Goand Babul etc
Honey	Invert Sugar
Kamela (<i>Mallotus philipensis</i>)	Burada-e-Surkh Eint (Red brick powder)
Kuchala seed (<i>Strychnos nuxvomica</i>)	Katak seed (<i>Strychnos potatorum</i>)
Leaf of Araluka (<i>Ailanthus excels</i>)	Leaf of Vasaka (<i>Adhatoda vesica</i>)
Manjeeth (<i>Rubiocordifolia</i>)	Kiratikta (<i>Swertiachirayta</i>)
Saunf (<i>Foeniculum vulgare</i>)	Stem of Tukhm-e-Hulba (<i>Trigonella foenu-graecum</i>)
Pippali (<i>Piper longum</i>)	Peepal (<i>Piper retrofractum</i>)
Sat-e-Giloe	Maiz Starch with Bhwana of Neem Water
Tabasheer	Calcium Oxalate, Calcium Silicate
Vidhara (<i>Argyrea nervosa</i>)	Farid booti (<i>Cocculus hirsutus</i>)
Yastimadhu (<i>Glycyrrhiza glabra</i>)	Gunjamool (<i>Abrus precatorius</i>)
Zafran (Saffron)	Identical shape & colures thread with saffron mixed to gain high profit
Zarnab (<i>taxus baccata</i>)	Talishpatra (<i>Abies webbiana</i>)

SUBSTITUTION: -

Due to non-availability or high cost in the market, there is a possibility of substitution of for example, Belladonna leaves are substituted with *Ailanthus* leaves; saffron is admixed with dried flowers of *Carthamus tinctorius*; mother cloves and clove stalks are mixed with clove; and beeswax is substituted by Japanese wax.

Chitrak (<i>plumbago zeylanica</i>)	Dantimool/apamarga kshar (<i>Baliospermum montanum</i>)
Dhanvayas (<i>fagonia cretica</i> linn.)	Duralabha (<i>fagonia cretica</i>)
Tagra (<i>valeriana wallichii</i>)	Kusht (<i>dolomiaea costus</i>)
Anhista ()	Mankind ()
Lakshma	Mayurshikha
Bakul (<i>Mimusops elengi</i>)	Lalkamal puspa and nilkamal puspa
Daruharidra (<i>berberis corylifolia</i>)	Haldi (<i>curcuma longa</i>)
Rasanjjana	Darvikwath
Saurastramritika	Saftika
Talishpatra (<i>abies spectabilis</i>)	Swarnatali
Ruchak namak	Rehnamak
Amlavetas (<i>garcinia</i>)	Chukra
Nakh	Lawingpuspa
Bharangi	Talishpatra and kantkari
Mulethi (<i>glycyrrhiza glabra</i>)	Dhatki
Draksha (<i>clerodendron serrotum</i>)	Gambhari
Gambhri phal (<i>gueline arbrea</i>)	Madhuk
Kasturi (maskmallow)	Kankol (<i>Cinna momum camphora</i>)
Kankol (<i>Cinna momum camphora</i>)	Jatipuspa
Karpura	Sundhaimotha/granthi (<i>Cyperus rotundus</i>)
Keshar (autumn crocus)	Kusumbh puspa (<i>Carthamus tinctorius</i>)
Sweat Chandan (<i>Santalum album</i>)	Kapur
Lalchandana (<i>pterocarpus santalinus</i>)	Khas (<i>crysopogon zizanioides</i>)
Aatis	Nagarmotha
Haritiki	Aamla
Naagkeshar (<i>mecus ferrea</i>)	Padmakesar (<i>nymphaea nouchali</i>)
Medamahameda	Satabri
Jibak, risibhak	Vidarikand
Ridhi, viridhi	Varahikand
Varahikand	Chrmakaralu

Vilava	Chitrak
Swarana	Swarnamakshik
Rajat	Rajatmakshik
Swarnamakshik	Swarngarik
Swarna / rajatbhasma	Kantloha bhasma
Kantlauha	Tikshna loha
Mukta	Muktasukti
Danti	Chitrk
Chitrk	Danti

Criteria of GMP rules and act under schedule –T for ASU drugs

CHAPTER III

IMPORT OF DRUGS AND COSMETICS

8. Standards of quality

9. Misbranded drugs

9A. Adulterated drugs

9B. Spurious drugs.

CHAPTER IV MANUFACTURE, SALE AND DISTRIBUTION OF DRUGS AND COSMETICS SECTIONS

16. Standards of quality.

17. Misbranded drugs.

17A. Adulterated drugs.

17B. Spurious drugs.

CHAPTER IVA

PROVISIONS RELATING TO AYURVEDIC SIDDHA AND UNANI DRUGS SECTIONS

33E. Misbranded drugs.

33EE. Adulterated drugs.

33EEA. Spurious drugs.

DISCUSSION

Adulteration and substitution are major problem of manufacturing the ASU drugs. Now a day may manufacture unit facing the crisis of row herb, so they have force to adulterate and substitute the row drug instead of genuine row drug. One of the main reasons of adulteration is increasing the price of row drug, it effects the quality of drug available in the market.

More than 300 medicinal plants on the red list and due to the lack of indigenous medicines because of deforestation, global warming, lack of proper cultivation methods, etc., the substitution of the herbs and herbal medicine is needed today. The essential criterion for

substitution is the pharmacological activity rather than the morphology or phytochemical constituents. This has to be justified in modern times using Ayurvedic principles and modern scientific tools. Today, the Ayurvedic pharmaceutical industry adheres to high-quality standards with modern technologies and equipment to maintain its quality.

CONCLUSION

All we know that in the era of industrialization and deforestation, shortage of many medicinal crud drug. So many manufactures company use substitute drug for making of the medicine, substitute is not the solution, because it deprived the quality and quantity of product and it effect the health of the people. some time it should be accepted for rare extinct spices.

All though the solution of adulteration and substitution is providing availability of raw materials in market, and it is quite possible if we promote the medicinal plant farming in mass level.

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