



IDENTIFICATION OF ADULTERANTS BY PHARMACOGNOSTICAL EVALUATION IN SELECTED MEDICINAL PLANTS

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ABSTRACT

Medicinal plants organize an effective source of folk and modern medicine. Correct identification, authentication and quality control are essential to ensure safety, therapeutic potency, efficacy and reproducible quality of herbal medicines. In India about 80% of the rural population depends on medicinal herbs and/or indigenous system of medicine for primary healthcare. The adulteration and substitution of crude drug is a burning problem. No doubt, substitution is helpful in places where unavailability of particular crude drug and or unwanted adverse effects of desired crude drug are there and have a choice of other drug with similar pharmacological effect and less unwanted after effects. But in most cases, it is unacceptable because the conversion of authentic drug into substandard drug may cause variety of adverse effects from mild and moderate to severe life threatening reactions. So, understanding of all the ways of adulteration and substitution is necessary to rectify this illegal act and maximizing consumers' safety

KEYWORDS: Siddha, Adulteration, Substitute drug, Market.

INTRODUCTION

Herbal medicine is the use of plants and plant remedies in the treatment and prevention of diseases. Plants have been used medicinally for thousands of years by cultures all over the world and are the main source of medicine throughout human history. That they are still widely used today is not a throwback to the Dark ages, but an indication that herbs are a growing part of modern high-tech medicine. The Siddha System of Medicine (Traditional Tamil System of medicine), which has been prevalent in the ancient Tamil land, is the foremost of all other medical systems in the world. Its origin goes back to B.C 10,000 to B.C 4,000. As per the textual and archeological evidences which indicate the remote antiquity of the Dravidian civilization of the erstwhile submerged land Kumarikandam, that is the Lemuria continent situated in the Indian ocean, the Siddha System of Medicine is contemporaneous with those of the submerged lands Egyptian, Mesopotamian, Chinese and Grecian medicines. The uniqueness of Siddha System is evident by its continuous service to the humanity for more than 5000 years in combating diseases and also in maintaining its physical, mental and moral health while many of its contemporaries had become extinct long ago. Siddha is a system of Indian traditional form of alternative medicine. Adulteration and substitution are frequent in raw material trade of medicinal plants. Herbal

adulteration is one of the common malpractices in raw material trade. At present the adulteration and substitution of herbal drugs is the burning problem in herbal industry. Adulteration is a practice of substituting original crude drug partially or by Exhausted Drugs

Adulterant

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

Adulteration Involves Different Conditions Deterioration

It results in impairment in quality of drugs.

Admixture

Addition of one article to the other due to ignorance, carelessness or accidentally

Sophistication

It is done intentionally or deliberately.

Substitution

In this a completely different substance is added in place of original drug.

Inferiority

A substituted drug is added.

Spoilage

Microorganisms attack the drug product.

Types of Adulterants**1. Substitution with substandard commercial varieties**

Adulterants resemble the original crude drug morphologically, chemically, therapeutically but are sub standard in nature and cheaper in cost. This is the most common type of adulteration.

S. No.	Drug	Family	Materials Substituted	Family
1	Strychnus nux-vomica	Loganiaceae	Strychnus potatorum Strychnus nux-blanda	Loganiaceae
2	Cassia angustifolia	Fabaceae	Cassia abovata Cassia auriculata	Fabaceae
3	Jamaica zinger	Zingiberaceae.	African, Japanese & Cochin Ginger	Zingiberaceae.
4	Aconitum heterophyllum	Ranunculaceae	Cryptocoryne spiralis	Araceae
5	Piper cubeba	Piperaceae	Piper clusi Piper lowong	
6	Rauwolfia serpentina	Apocynaceae	Rauwolfia canescens Rauwolfia vomitoria Rauwolfia hirsuta	Apocynaceae
7	Saraca indica(bark)	Fabaceae	Trema orientalis Polyalthia longifolia	Annonaceae

In this type, the substituted products are very similar in appearance to the original drug. Hence, the adulterants used here may resemble the original crude drug by morphological, chemical and medicinal characters but are substandard in nature, therefore, cheaper in cost. This type of adulteration is very common.

2. Substitution with superficially inferior drugs

In this type, inferior drugs are substituted and they may or maynot have any chemical or medicinal value as that of the original drug. Due to their morphological resemblance to the original drug, they are marketed as adulterants.

S. No.	Drugs	Substituted material without medicinal value
1	Black pepper	Papaya seeds
2	Coffee powder	Tamarind seed powder
3	Black mustard seeds	Argemone seeds
4	Saffron	Carthamus tinctorius
5	Clove buds	Clove stalk and dried leaves
6	Coriander powder	Faecal matter of donkey
7	Cinnamon bark	Cassia
8	Bees wax	Japan wax
9	Senna leaves-Cassia angustifolia	Leaves of Cassia auriculata
10	Paddy grains	Small white stones

3. Substitution with artificially manufactured substances

In this type, substances that are artificially prepared to resemble original drugs are used as substitutes. This method is practiced for much costlier drugs.

S. No	Drug	Substituted materials without medicinal value
1	Coffee powder	Compressed chicory powder
2	Bees wax	Yellow coloured paraffin wax

4. Substitution of exhausted drugs

In this type, the same drug is admixed but it is without any medicinal value,as they are already extracted out.

S. No	Drug	Exhausted Drug
1	Tea leaves, Ginger	Used tea leaves
2	Pepper seeds, Liquorice	Used pepper seeds
3	Cumin seeds	Used cumin seeds
4	Fenugreek	Used fenugreek seeds
5	Fennel	Used fennel seeds

6. Volatile oil containing drugs like clove, coriander, fennel, caraway are adulterated by this method.**5. Substitution with synthetic chemicals**

Sometimes synthetic chemicals are added to enhance the natural character as in the case of,

- Addition of benzyl benzoate to balsam of Peru.

- Citrial to citrus oils like lemon oil & orange oil.
- Similarly drugs like oleo gumresin, myrrh, gumkino, balsam of tolu etc. also adulterated with different products of similar nature as a matter of routine.

6. Substitution of vegetative matter from the same plant

Sometimes the other plants growing along with medicinal plant are mixed with the drug due to their resemblance in colour odour and in some cases in similar constituents.

Ex. Lower plants like moss, Liverworts and Epiphites growing on bark portion are mixed with Cascara or Cinchona and Lichens (kalpasi).

The stem portions are mixed along with leaf drugs like Senna.

7. Substitution with harmful adulterants

Several times, wastes from the market are collected and admixed with authentic drug. This is particularly noticed for liquids or unorganized drugs.

S. No.	Drug	Harmful adulterant
1	Piece of amber	Coloured glass
2	Asafoetida	Limestone
3	Opium	Lead shot
4	Coconut oil	Coco butter is adulterated with stearin or paraffin
5	Cardamom seed	Rodent faecal matter
6	Glycyrrhiza glabra(root)	Stones
7	Benzoin	Small sized stones and sandy/earthy materials
8	Silver grain cochineal	Barium sulphate
9	Black grain cochineal	Manganese dioxide

8. Substitution of powders with non-plant materials

Adulteration with non-plant materials or powder to a particular originals crude drug is very common nowadays in the market.

S. No.	Original powdered drug	Adulterated powder
1	Strychnus nux vomica powder	Olive stone powder
2	Asafoetida	Gum Arabic, Red clay, Gum resins, Rosin
3	Nutmeg	Broken kernels moulded with clay Shaped pieces of wood
4	Gentia lutea (root)	Olive stone powder
5	Glycyrrhiza glabra (root)	Olive stone powder
6	Piper nigrum powder	Olive stone powder
7	Strychnus nux vomica powder	Guaiacum wood powder
8	Ipecacuanha	Dextrin
9	Colocynth, Ginger	Exhausted ginger powder
10	Chilli powder	Red sandal wood/Brick powder
11	Coriander powder	Powdered faecal matter of donkey

9. Substituting similar or closely resembling materials

In this form of adulteration materials which are somewhat resembling or are similar in kind but have no relation to the authentic material.

S. No	Drug	Family	Closely resembling material	Family	Part
1	Glycyrrhiza glabra	Fabaceae	Abrus precatorius		Root
2	Piper nigrum (fruit)	Piperaceae	Carica papaya Lantana indicum	Verbenaceae	Seed Seed
3	Atropa belladonna	Solanaceae	Ailanthus		Leaf
4	Syzygium aromaticum	Myrtaceae	Cinnamomum wightii	Lauraceae	Poomottu?
5	Mucuna pruriens	Fabaceae	Kattu poonaikali?		Seed
6	Ferula asafoetida	Apiaceae	Pterocarpus marsipium	Fabaceae	
7	Olive oil		Peech seed oil?		
8	Catharanthus roseus	Apocynaceae	Solanum melangena	Solanaceae	Root

10. Similarity in Taste and Colour

1	Gentiana lutea	Gentianaceae	Various species of aloe(Liliaceae)	Bitter taste
2	Crocus sativus	Iridaceae	Artificial colour to be given	Red colour

CONCLUSION

Substitution of the herbs is the need of the hour with more than 300 medicinal plants becoming red listed. It has provided greater scope for the physical to utilize herbs that are easily available, cost effective and most appropriate for the clinical condition. It is not that all adulterations are intentional malpractise as stated in many literatures with one experience it is noted that the herbal drug are adulterated unintentionally also. Suppliers are illiterate and not aware about their spurious supply. Major reasons are confusion in name, non-availability and lack of knowledge about authentic plant. Even scientific community and traditional physicians are unaware of it. Suppliers and traders should be educated about the authentic sources.

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