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Adulteration of crude drugs burning problem

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Abstract

Traditional medical systems remain important resources of healthcare worldwide that are reported to be safe and produce minimum side effects compared to synthetic medicines. Adulteration is the burning problem in modern era. Incorrect knowledge, incorrect identification, deforestation and personal benefits have resulted in adulteration. In India normally the contamination/adulteration in food/crude drugs is done either for financial gain or due to carelessness and lack in proper hygienic condition of processing, storing, transportation and marketing. This article throws a light on adulteration, types, common market adulterants and its further analysis.

Keywords: Adulteration, Deforestation, adulterants, crude drugs.

Introduction

Ayurveda can be seen as one of the most visible faces of alternative medicines practiced throughout India. In modern era there is a growing tendency towards herbal medicine. Therefore herbal therapies made a huge comeback and people once again showed their interest in herbal therapies. The major problem in the wider acceptability of Ayurveda and its products is the lack of proper standardization techniques of raw materials used in manufacturing. Most of the raw materials come from plant source. These raw materials often adulterated with same herb of low quality or with similar looking different herbs. In general, adulteration is considered as profit related intentional malpractice^[1].

The term adulteration of an article covers a number of conditions which may be intentional or accidental^[2, 3]. 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^[4, 5]. Due to adulteration, faith in herbal drugs has declined^[6].

History

In Ancient Ayurveda texts, such artificially prepared drugs are mentioned. Chakrapani quoted about the sahja (natural) and kritima (artificial) viryas^[7]. The kritima virya indicates towards the concept of active principle of modern times^[8]. In *Raja Nighantu* artificially prepared *Karpura* and *Kasturi* is mentioned. Bhavaprakasha Nighantu discusses about substitution^[9]. Though substitution too considered as part of adulteration now a days, the intention of Ayurveda Acharyas was to provide same equally potent drugs in the absence of genuine drug^[10].

Gradually, the commercial outlook and disruption in traditional and ethical practice of Ayurveda have affected the system and today adulteration and substandard medical preparations have become the bane of Ayurveda.

Reasons of Adulteration

The drug adulteration come into play because of commerce. In this practice, the genuine substances are replaced by other similar materials. This is known as Adulteration. Whenever a drug is scarcely available or because of high cost of the drug adulteration is done. Confusion in Vernacular Names, Lack of Knowledge about Authentic Source. Similarity in morphology, Lack of authentic plant, similarity in colour, careless collection etc. are the reasons of adulteration.

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Types of Adulteration

Adulteration may take place by two ways:

- Direct or intentional adulteration
- Indirect or unintentional adulteration\

a. Direct Adulteration-

Direct or intentional adulteration is done intentionally which usually includes practices in which an herbal drug is substituted partially or fully with other inferior products. Due to morphological resemblance to the authentic herb, many different inferior commercial varieties are used as adulterants. These may or may not have any chemical or therapeutic potential. Substitution by “exhausted” drugs entails adulteration of the plant material with the same plant material devoid of the active constituents. This practice is most common in the case of volatile oil-containing materials, where the dried exhausted material resembles the original drug but is free of the essential oils [12]. Foreign matter is also used as adulterant in crude drugs e.g. stone, Medicinal plant dealers have discovered the scientific methods in creating adulteration of such a high quality that without microscopic and phytochemical and physicochemical analysis, it is very difficult to trace these adulterations [13, 14].

Totally Different drug-

Bharangi (*Clerodendrum indicum*) and Kantakari (*Solanum xanthocarpum*). Bharangi has bitter taste; laghu (light), ruksha (unctuous) guna (quality) and has Kapha-vata hara property. While Kantakari (*Solanum xanthocarpum*) has *katu vipaka* (pungent digestion) and *ushna virya* (hot potency). It has glycosides named verbascoside and solasonin, solamargin, solasurine respectively. Both *C. indicum* and *S. xanthocarpum* have shown antihistaminic activity. Both *C. indicum* and *S. xanthocarpum* are commonly used in the diseases related to the respiratory system, which are usually associated with release of histamines and other autacoids [15].

With inferior quality materials

Inferior quality material may or may not have same chemical or therapeutic value as that of original natural drug due to their morphological resemblance to authentic drug, they are marketed as adulterants e.g. *Belladonna* leaves are substituted with *Ailanthus* leaves, *papaya* seeds to adulterate *Piper nigrum*, mother cloves and clove stalks are mixed with clove, *Saussurea lappa* in place of *Inula racemosa*.

With exhausted material

Many drugs extracted on large scale for isolation of active principle, volatile oils etc. the exhausted material may be used entirely or in part as a substituent for the genuine drug e.g. umbelliferous fruits, cloves (without volatile oils) are adulterated with exhausted (without volatile oils). Similarly in market two types of cardamom are available green as well as brownish. Green cardamom are fresh and in brownish are without volatile oils.

With foreign matter

Sometimes synthetic chemicals are used to enhance the natural character e.g. addition of benzyl benzoate to balsam of Peru, citral to citrus oils like oil of lemon and orange oil etc

With harmful substances

Sometimes the wastes from market are collected and admixed with authentic drugs particularly for liquids or unorganized drugs e.g. limestone in asafoetida, lead shot in opium, white oil in coconut oil, cocoa butter with stearin or paraffin [16].

Adulteration of powders

Besides entire drug powder form frequently found to be adulterated e.g. powder liquorice or gentian admixed with powder olive stones, under the name of cinchona, *C. calisaya* wedd., *C. officinalis* Linn.f., *C. ledgeriana* and *C. succirubra* are available as mixtures.

B. Indirect or unintentional adulteration

Unintentional adulteration which sometimes occurs without bad intention of the manufacturer or supplier. Sometimes in the absence of proper means of evaluation, an authentic drug partially or fully devoid of the active ingredients may enter the market. Factors such as geographical sources, growing conditions, processing, and storage that influence the quality of the drug [11].

Discussion

Due to adulteration faith in herbal drugs has declined. Adulteration in market samples is the greatest drawback in promotion of herbal drugs.

Tables 1: Commonly used adulteration in Ayurveda

SR. No.	Main drug	Adulterants
1	Gum of Guggul (<i>Commiphora wightii</i>)	Gum of Shallaki (<i>Boswellia serrata</i>)
2	Leaf of Araluka (<i>Ailanthus excels</i>)	Leaf of Vasaka (<i>Adhatoda vesica</i>)
3	Arimeda (<i>Acacia fernaciana</i>)	Aragvadha (<i>Cassia fistula</i>)
4	Kuchala seed (<i>Strychnos nuxvomica</i>)	Katak seed (<i>Strychnos potatorum</i>)
5	Manjistha (<i>Rubia cordifolia</i>) 8.	Kiratikta (<i>Swertia chirayta</i>)
6	Pattanga (<i>Caesalpinia sappan</i>)	Raktachandan (<i>Pterocarpus santalinus</i>)
7	Kampillaka (<i>Mallotus philipensis</i>)	Istica churna (brick powder)
8	Yastimadhu (<i>Glycyrrhiza glabra</i>)	Gunjamool (<i>Abrus precatorius</i>)
9	Pippali (<i>Piper longum</i>)	Chavya (<i>Piper retrofractum</i>) and Tambula (<i>Piper betle</i>)
10	Guduchi satva (<i>Tinospora cordifolia</i>)	Powder or flour of potato, sweet potato.
11	Erandkarkati seed (<i>Caryca papaya</i>)	Maricha (<i>Piper nigrum</i>)
12	Vidanga (<i>Embelia ribes</i>)	Sp.of Vidanga (<i>Myrsine Africana</i>)
13	Arjuna (<i>Terminalia arjuna</i>)	Jarula (<i>Lagerstroemia speciosa</i>)
14	Ashoka (<i>Saraca asoca</i>)	Kasthadaru (<i>Polyalthia longifolia</i>)
15	Talish patra (<i>Abies webbiana</i>)	Sthaunyak (<i>Taxus baccata</i>)
16	Vidhara (<i>Argyrea nervosa</i>)	Rivea hypocrateiformis, cocculus hirsutus

World Health Organization (WHO), in its publication on quality standards for medicinal plant materials, recommends rejecting of any batch of raw material, which has more than 5% of any other plant part of the same plant (e.g. stem in leaf drugs), never the less if they are derived from the authentic plant. Based on these standards, adulteration whether, intentional or unintentional, should be rejected. Suppliers and traders should be educated about the authentic source.

Conclusion

The lure of riches and general apathy towards mankind has led to adulterants being added to drugs. Suppliers are illiterate and are not aware of their spurious supply. Some Major reasons are name confusion, non-availability and lack of knowledge about the authentic plant.

The manufacturers need to identify the source plant and utilize to achieve better therapeutic efficacy. The appropriate level of testing must therefore carefully assessed. Using the raw materials based on monographs available in different official books and various regulatory guidelines including W.H.O guidelines.

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