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A REVIEW ON ADULTERATION OF CRUDE DRUGS

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ABSTRACT

For millions of year human population is using herbal plants for health issue. Herbal products are becoming very popular in recent era due to its less side effect and ease availability. This increases the demand for raw materials exponentially. However, production growth is still linear. Now days adulteration and substitution of crude drugs is major burning problem that threatens the integrity ofayurvedic medicine. There is no doubt, substitution is helpful in place where unavailability of particular crude drug and or unexpected adverse effect of desired crude drug are there and have a choice of other drug with similar pharmacological effect. In most case it is unacceptable because of the conversion of authentic drug into substandard drug. Imprecise knowledge, misidentification, deforestation, personal profit led to adulteration. Therefore, understanding of all ways of adulteration and substitution is necessary for consumer safety. The adverse consequences of adulteration on health have only recently begun to be recognised and registered. This article based on adulteration, its type and various methods of adulteration and standardization of crude drugs.

KEYWORDS: Adulteration, Crude drug, Evaluation methods.

INTRODUCTION

Now a day's people have developed an interest in traditional medicine due to the side effects of modern medicine. Herbal drugs being the base of ayurvedic medicine. Very often we hear that herbal products are natural, they are safe, unfortunately this is not always true because of many reasons & one among them is Drug Adulteration. In ancient days, *Vaidyas* used to treat their patients on individual basis and prepare drug according to the requirement of the patients but now the scenario has changed, herbal medicines are being manufactured on large scale. There is gradual increase in malpractice due to increase in demand and interest of herbal drugs. Increase demand for raw materials even as medicinal plants worldwide are facing the threat of becoming extinct or endangered. The deforestation and extinction of species & erroneous identifications intentionally or unintentionally of many rare, endangered plants has resulted in a quality assurance and quality control of herbal drugs. The adulteration precisely defined as crude drug appears to be genuine as its morphological similar and sometimes chemically indistinguishable. Adulteration is deliberate or accidental. substitution of a crude drug partially or completely with other substances which are either free or inferior in therapeutic or chemical properties.[1] crude drug evaluation is not an easy because of so many influential factors affecting bio efficacy and reproducibility of therapeutic effects. Standardization provides all possible careful process taken from collection, manufacturing till drug dispensing for clinical use.

DEFINITION

1. Adulteration defined as admixture or substitution of genuine articles with other spurious, inferior, defective, spoiled, useless, other parts of the same or different plant or harmful substances or drug which do not conform with the official standards.[2]
2. practice of substituting the authentic crude drug partially or fully with other substances which is either free from or inferior in therapeutic and chemical properties. Addition of poor quality or spoiled drugs or entirely different drug similar to that of original drug substituted with an intention of enhancement of profits.[2]

Adulteration by two ways[3]

(a) Deliberate adulteration.
(b) Undeliberate adulteration.

deliberate adulteration[3]

• Known as Direct Adulteration or Intentional Adulteration. In this type adulteration is intentional and involves the practice where herbal drugs are partially or entirely replaced by other inferior products, which may have chemical potential.

Undeliberate adulteration[3]

- Known as Indirect Adulteration or Un-intentional Adulteration. It occurs any time without any bad intentions on the part of the manufacturer or supplier. Many factors affect the quality of the drug, such as, growing conditions, geographical sources, processing methods, and storage methods due to which an adulterated drug may enter the market.

Methods of Adulteration[1]

1. Substitution- Replacement of original drug with morphologically similar drug but chemically and therapeutically inferior drug.
2. Deterioration- Impairment of the quality or value of substitute drug due extraction of the constituents or volatile oils and sale of residue as original drugs.
3. Admixture- Addition of one article to another through ignorance, accident or carelessness.
4. Sophistication- Substituents which look morphologically similar and superior than the authentic drug is added to improve the appearance.
5. Inferiority- In this method drug is added whose natural constituent is below the minimum standard for that particular drug. This can be avoided by careful selection of the drugs.
6. Spoilage- Substandard condition of drug due to attack of microbes and which makes product unfit for consumption. This situation avoided by proper drying and storage of products.

Reasons for adulteration[4]

1. Confusion in vernacular names: There are various synonyms for one plant Ex. Amruta is common synonym of *Guduchi (Tinosporacordifolia*) and *Haritaki (Terminaliachebula)*. So, confusion in vernacular names may leads to adulteration.
2. Similarity in morphology: Morphologically similar drugs are generally adulterated.ex. Bark of *Arjuna* is adulterated with bark of *Ashoka.*
3. Lack of knowledge about authentic source: Lack of original plant availability, in the required quantity leads to adulteration and substitution. Due to lack of knowledge of authentic drug and authentic sources of such drugs result into adulteration. Ex. *Mesua ferrea* market samples are adulterated with flowers of *Calophyll uminophyllum* because of unawareness ofsuppliers.
4. Unscientific and careless collection: Careless collection of herbal drugs may lead to admixture. Large amount of raw material collected by uneducated persons may causeadulteration

Adulteration Types[5]

1. Substitution with Artificially Manufactured Substance: Original drug is substituted with artificially manufactured substance. Ex. Paraffin wax substituted for bee's wax.

2. Substitution with Superficially Similar Inferior Drugs: Cheaper substances are being used due to the morphological similarity to the authentic drug, and may or may not have any chemical or therapeutic value contrary to the authentic drug. Ex. *Adraka* is adulterated with Japanese Ginger.

3. **Substitution with Exhausted Drug:** The same drug is admixed but does not have any chemically active constituents because these are already extracted out. Ex. *Lavanga (Syzygiumsaromaticum).*

4. Harmful adulterants: Waste form of drug which may be harmful for health is added to authentic drug. Ex. White oil in coconut oil.

5. Adulteration of Powders: Adulteration is often done in powder form of drug to decrease its cost by increasing weight. Ex. *Shunthi* powder is admixed with wheat flour.

Evaluation methods which can help to overcome adulteration[6]

Microscopic evaluation of drug: With the help of microscope Identification of drug is done. Taking longitudinal and transverse sections to examine drugs histological characters, like calcium oxalate crystals, stomata index, starch gain etc.

Morphological or Organoleptic test: This is quantitative type of evaluation. With the help of sense organs morphological or organoleptic evaluation can be done. Drug can be identified by size, shape, odour, colour, shape, fractures and texture.

Physical evaluation of drug: For detection of active components in plants, physical properties of drug are helpful.
Ex. Moisture content, foreign matter, viscosity.

Biological evaluation of drug: Herbal plants contain chemical constituents by which they show biological and pharmacological actions. Drugs pharmacological action can be utilized for their evaluation. Ex. hepato-protective activity, Anticancer activity.

CONCLUSION

There are numerous records of adverse effects and deaths related with herbal drug products, the distribution of adulterated products, and the increase in misleading claims on the social media demand proper action to protect the people's health. To solve this problem, we can take help from literature, expert opinion, pharmacokinetics/dynamics. understanding the ways of adulteration, more research and information required to minimize the illegal act adulteration, for improving consumers' safety. Identification of plants, conservation and cultivation of endangered medicinal species are the measures to overcome adulteration.

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