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HERBAL DRUG ADULTERATION IN AYURVEDA

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ABSTRACT

Ayurveda is Ancient Holistic science of medicine and Sacred with its traditional values. *Ayurveda* has its own fundamental principles like *Panchbhautik siddhant, Tridosha siddhant* etc. *Ayurveda's* prime motive to cure disease, prevention of disease & maintance of healthy individual. Nowadays increasing Awareness of traditional system of medicine directly promotes *Ayurveda* Treatment, so *Ayurveda* has increasing Demand on global platform. Worldwide there is increasing several type of lifestyle disorders and autoimmune disorders having Ultimate treatment in *Ayurveda* which Promotes medicine and increasing demand in herbal medicine. But due to certain endangered species, controversies among some of species of drug, deforestation there is less supply of authentic drug, because of these reason in marketing, suppliers admix substitutes, inferior, spurious part of drug to fulfill demand of supply and for commercial profit. Drug adulteration is burning issue in herbal therapeutics. Adulteration is nothing but debasement of article. Responsible which do not give full efficacy of drug preparation and formulation of herbal drug for prevention and promotion of *Ayurveda* by detection of adulteration using by various analytical techniques we are trying focus on this current burning issue.

KEYWORDS: *Ayurveda*, Adulteration, Formulation, Substitute.

INTRODUCTION

Ayurveda is traditional system of medicine deals with its Fundamental Principles which is given in its classical texts. Ayurveda has treasure of herbal medicinal plants which cures so many diseases like autoimmune diseases, Lifestyle diseases etc. Herbal medicinal plants has synonyms which mentioned in different classical text due to this reason or uneducated drug collector person there is issue of Drug Adulteration. It may be due carelessness or intentional for economic profit or due to scarcity of drug. in the form of Admixing of inferior, spurious products. Scarcity of drug will refer to substitution in which replacement by another drug which is not same as original drug but having qualities like original crude drug. Adulteration is term as debasement of article. Adulteration is a practice of original raw drug which either whole with other spurious substance.It is practice of substitute original crude drug whole or partially with other counterfeit substance which is either free from.[1] It is current burning issue influencing in Herbal industry and *Ayurvedic* Medicine, which affects its therapeutic outcome. so the ultimate aim of this topic is focus on standardization of drug and identification of original crude or fresh drug to rid of Adulteration issue.

AIMS AND OBJECTIVE

1. To study the adulteration of Ayurvedic drugs.
2. To study the methods of identification of adulterants in the drugs and standardization of these drugs.

METHODOLOGY

The different types of adulterations used nowadays, various methods to identify the pure drug and also the added adulterant, related to standardization of ASU drugs as described by the Ayurvedic Pharmacopoeia of India will be briefly described in this study.

Methods of Adulteration[2]

- Deterioration
- Admixture
- Sophistication
- Substitute
- Inferiority
- Spoilage.

- **Deterioration**

Envisage extraction of the constituents like active principles and the marketing of the residue as the original natural drugs. This will refer similar drug is admixed but that drug is devoid of medicinally active principle as it has been already extracted. Mainly volatile oil containing drugs for Example like Clove (*Syzygium aromaticum Linn.*), Coriander *(Coriandrum Sativum Linn.), Twak (Cinnamomum zeylanicum)* are adulterated by this method.

- **Admixture**

Addition one article to another by accident, ignorance or carelessness. A part of same plant which is devoid of therapeutic action is mixed. For Example Stem portions are mixed along with leaf in drugs like –*Bala (Sida cordifolia), Dhattura (Datura metel)* Inclusion of soil and stone pieces in *Hingu (Ferula narthex Boiss.) and Guggul (commiphera mukul).*

- **Sophistication**

Refer to Deliberate addition of inferior and spurious drug, drugs which are in the form of powders are frequently adulterated by this method. Example: Addition of wheat flour to powdered ginger, powdered bark adulterated with brick powder, *Gorochan churna* adulterated with turmeric powder, *Khadira* (*Acacia catechu Willd.)* replaced by black soil.

- **Substitute**[3]

Refer to Addition of total different drug at place of original drug. In case of unavailability of drug. In Classical text *Acharya Bhavmishra* mentioned *Ashtavarga Pratinidhi* dravyas can be used as substitute, Nowadays these are used in *Chyawanprash* instead of original drugs. As per shown in table,

Sr.No.	Drug	Substitute(*Pratinidhi Dravya*)
1.	*Meda-Mahameda*	*Shatavari*
2.	*Jivak-Rushabhak*	*Vidarikanda*
3.	*Kakoli-Kshirkakoli*	*Ashwagandha*
4.	*Ruddhi-Vruddhi*	*Varahikanda*

Some other substitute drugs like instead of *Chitrak* (*plumbago zeylanica*) *Danti* (*Baliospermum montanum*) & *Apamarga Kshar* is used.[4]

- **Spoilage**

Spoilage of drug due to attack of microorganism infestation. It can be prevented by using cool and dry storage. For Example *Ativisha (Aconitum heterophyllum Wall.), Vastanabha (Aconitum ferox Wall.)*

- **Inferiority**

Refer to any Replacement with substandard drug. Adulterants resembles the original crude drug morphologically, chemically, therapeutically but are substandard in nature and cheaper in cost substandard drug, Because the original manufacture crop is substandard. For Example, *Shunthi* (*Zingiber officinalis*) adulterated with Japanese ginger.

Causes of Drug Adulteration

1. Commercial purpose.
2. Enhancement of profits and supply
3. Scarcity of drug[5]
4. Increasing demand of drug
5. Improper drug collection by uneducated person.
6. Controversies among medicinal plant species
7. Deforestation

TYPES OF ADULTERANTS[6]

There are different type of Adulterants are given these are as follows:

I. Substitution with substandard commercial varieties

This method is commonly practice rather than another practice. There is Adulteration is done by substandard variety resembles with Morphological structure, Chemical composition, therapeutic characters of original crude or Raw drug. For Example *strychnous nux blanda* or *s.potatorum (fig 2)* in *Strychous nux vomica Linn. (fig 1.)* Gentian substituted by *kutki (Picrohiza kurroa Royle ex Benth.)*

Fig. 1: Strychnos nux vomica.

Fig. 2: Strychnos potatorum.

II. Substitution with superficially similar inferior drugs

In this adulteration practice original drug may or may not be replaced by similar, Chemical and therapeutic character, but if its Morphological characters resembles or similar to original natural drug then drug adultered by mentioned variety. For example saffron (*Crocus sativum L.*) Fig 3. substituted by Carthamus tintorius Fig.4.

Fig. 3: Crocus sativum.

Fig. 4: Carthamus tintorius.

III. Substitution with artificially manufactured substances

In this adulteration practice artificial drug manufactured which look similar to original raw drug, this type of adulterants using in case of price or cost original drug high for commercial purpose. For Example compressed chicory (Fig 5) substituted by coffee (Fig 6).

Fig. 5: Chicory.

Fig. 6: Coffee.

IV. Substitution with exhausted drugs

There is practice of adulteration take place by exhausted drug like volatile oil containing drugs like clove(*Syzygium aromaticum Linn.*), Caraway, Coriander *(Coriandrum Sativum Linn.),* fennel *(Trigonella foenum-graecum Linn.).* Similar drug is used in adulteration but drug is maybe devoid of its active principle because of its separation of extraction before. For

Example Artificial colouring of Exhausted Saffron (Fig 7.) (*Crocus sativum Linn.)* or ginger is replaced by spoiled ginger.

Fig 7: Artificial colored Saffron.

V. Presence of vegetative matter from the same plant

In this type adulterant used in practice is stem of portion plant is replaced by leaves of that plant same plant For Example Senna *(Cassia angustifolia Vahl)* (Fig.8 & Fig.9) Otherwise one miniature of plant is mixed with medicinal drug due to its colour, Morphology.

Fig. 8: Senna pods.

Fig. 9: Senna leaves.

VI. Harmful adulterants

Waste product from market are collected and mixed with original natural drug. For Example limestone mixed with Asafetida (*Ferula narthex*), white oil in coconut oil *(Cocos nucifera Linn.)*

VII. Adulteration of powders

Powder form of drug are frequently adulterated. For Example red sanders wood (Fig.11) in capsicum (Fig 10), powdered bark is replaced by brick powder. Powders are easy to admix with adulterants.

Fig. 10: Capsicum.

Fig. 11: Red sanders wood.

METHODS OF DETECTION OF ADULTERATION[7][8]

1. To establish the identification (Drug Evaluation)

A. Morphological Evaluation

B. Microscopic Evaluation

C. Chemical Evaluation

D. Physical Evaluation

E. Biological Evaluation

A. Morphological / organoleptic Evaluation

Refers to evaluation of drugs by colour, odour, taste, size, shape and special characters like texture, touch etc. For Example pungent taste of capsicum.

B. Microscopic Evaluation

This type of examination gives the detail knowledge of drug by histological characters. Most commonly used qualitative evaluation of crude drug or powdered forms. Histological study are made by very thin section of drug. In this type of evaluation quantitative microscopy is used as follows;

Diagnostic characters of leaves

i. Palisade ratio-Average number of palisade cells beneath each epidermal cell & Can be determines with powdered drugs.

ii. Vein-islet number-The number of vein-islets per sq.mm of the leaf surface midway between the mid rib and the margin.

iii. Vein termination –number of veinlet terminations per sq.mm of epidermis of the leaf surface midway between midrib & margin.

iv. Stomata number-number of stomata per sq.mm of epidermis of the leaf.

v. Stomata index-% which the numbers of stomata form to the total number of epidermal cells.

3. Chemical evaluation

It encompass various chemical tests and assays.

Methods for chemical evaluation-Isolation, Purification, Identification.

Uses-evaluation of resins, balsams, volatile oils and gums.

Qualitative chemical tests are useful for the detection of adulterations. e.g., colophony admixed as adulterant for resins detected by copper acetate.

Phytochemical examinations

These are carried out in different four stages

i. Procurement of raw material

ii. Extraction, Purification & characterization of the constituents.

iii. Investigations of biosynthetic pathway

iv. Quantitative evaluation

4. Physical Evaluation

For determination of drug this wherever possible these physical standards are used. As follows;

i. Moisture content

Importance of moisture analysis: The % of active chemical constituents in raw drugs is mentioned on air- dried basis. Moisture content of drug must be minimized to prevent chemical change or microbial contamination of drug.

ii. Viscosity

Liquid is constant at given temperature & so it can be used as means of standardization of liquid drugs.

iii. Melting point - is very sharp &constant used to evaluate the purity of crude drugs, pure chemicals / phytochemicals.

Iv. Solubility- use to detect the presence of adulterant. e.g., Asafoetida soluble in carbon disulphide.

v. Refractive index- Depending upon purity of liquid drug constant it can used as standardization criteria. e.g., Castor oil 1.4758 to 1.527 Refractive index.

vi. Optical rotation- Certain drugs are optically active for their pharmacognosy this criteria are used.

vii. Ash Content-The residue remain after incineration.

Use-To evaluate the inorganic salt naturally present in original drug or adulterant added drug.

viii. Extractive value- Different solvent used for Extractives.

Use- To determine the chemical constituents of drug.

a. Water soluble extractive- method applicable for crude drug which have water soluble active chemical composition, e.g. tannins, sugar, glycosides etc.

b. Alcohol soluble extract- To determine resin content of drug. Usually 95% Ethyl alcohol is used.

ix. Foreign organic matter –Any part other than name explained in description of drug is foreign matter.

Use-to evaluate the quality of drug.

Chromatographic techniques

A group of methods for separating molecular mixtures that depend on the differential affinities of the solute between two immiscible phases.

TLC & HPTLC techniques are important tool for microananalytical separation and determination of natural product.

E. Biological Evaluation

When the determination of potency of crude drug on living organism like bacteria, fungi, animal tissue or animal called as bioassay. This method is used when chemical and physical

standardization methods are not done adequately. Three types of bioassay i. Toxic ii. Symptomatic iii. Tissue method. For toxic and symptomatic method animals are used.

Tests for Authentic Drugs

1. *Keshar (Crocus sativum Linn.)*[9]

I. If *Spirit* is added in keshar the natural colour of keshar remains same.

II. Dark blue colour solution formed If H_2SO_4 added in Keshar.

2. *Hingu (Ferula narthex)*[10]

I. if H_2SO_4 is added on fresh piece of hingu it will form red colour.

II. After incineration Ash of hingu smell just like original hingu.

3. *Guggulu (Commiphera mukul)*

I. Whitish fume seen on incineration.

II. Solubility-In hot water g*uggulu* dissolve completely.

4. *Khadir (Acacia catechu)*

125 mg powder of acacia catechu mixed with 5ml of alcohol after filtration form Green colour.

CONCLUSION[11]

Since many years the nature and degree of determination of raw drugs has undergoes change, initially, the crude drug were identified by association with standard description available, Due to progression in chemical familiarity of crude drugs, at present condition, evaluation also includes method of estimating active constituent present in the crude drug, in addition to its morphological and microscopic analysis. With the advent of separation technique and instrumentation analysis, it is possible to perform physical evaluation of a crude drug which could be both qualitative and quantitative. The biological behavior of crude drug extracts constitutes pharmacological evaluation. The Raw drugs can be identified on the basis of their morphological, histological, chemical, physical and biological studies.

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