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Review Article

Adulteration and it's analytical techniques of evaluation

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ABSTRACT:
This is a review article regarding adulteration & its evaluation. It describes definition & various types of adulteration & also various analytical procedures to evaluate it. There are various analytical tests which are performed to identify the crude drug. These analytical techniques are vary essential for authentification of drug as the adulterated one can affect the potency, efficacy of drug. This article includes evaluatory tests like Organoleptic evaluation, Microscopic evaluation, Physical evaluation, Chemical evaluation, and Biological evaluatory methods. This is compilatory work where these methods or techniques are described, which may be helpful for readers, students and research scholars to get short summary regarding adulterations, its type and analytical evaluation tests and techniques. This article concludes the summary of various aspects regarding adulteration and its evaluation which may give further vision to scholars in research field.

KEY WORDS: Adulteration, Organoleptic Evaluation, Microscopical Evaluation, Physical & chemical evaluation, DNA finger printing.

INTRODUCTION:

Adulteration: It is substituting original crude drug partially or completely with similar looking substance.

This substance may be inferior in chemical and therapeutical properties than the original one or may be having totally different properties. Near about 39% of global and 80% of Indian population depends upon traditional medicine system and due to this popularity, there is increased demand of herbal or traditional medicines. But at the same time there is less availability and supply of these crude drugs, leads to Adulteration of drugs. Adulteration is also described as "Intentional substitution or addition of a foreign substance to increase the weight or potency of product to decrease its cost value.

This includes:-

1. Deterioration- That is compromise or impairment in drug quality.
2. Admixture-This is because of ignorance or carelessness in crude drug handling, or adding another substance in original one.
3. Sophistication-It is intentional adulteration by adding completely different substance in place of original crude drug.
4. Inferiority-It means the drug having low potency or low efficacy i.e. any sub-standard drug is presented instead of original drug.
5. It is loss of efficacy and potency of drug due to micro -organisms and such drug is used for the production.

Unintentional Adulteration

1. Confusion in vernacular names- this may lead to replacement of drug by different species or by totally different plant.
2. Drug Identification and Authenticity- Lack of knowledge of drug identification and its authenticity may give rise to adding original drug with different plant.
3. Similarity in Morphology: similarity in morphological characters leads to confusion and result into adulteration.
4. Careless collection: Due to carelessness in crude drug collection there are chances to get admixtures by another vegetative part of same plant or by some different plants.

Any kind of adulteration, it may be intentional or unintentional causes compromise in quality, potency and efficacy of drug which is harmful for Traditional system of medicine and Herbal industry as it impresses the result of drug on patients.

So one has to be careful about cultivation, collection, identification, authentication and production of drug. For drug identification and authentication, there are various Analytical aspects which help in Evaluation of adulteration.

DISCUSSION:

Evaluation of drug Drug evaluation is very important with respect to identification and quality and purity of Drug. It helps in determination of adulterants and substituents.

1. Techniques for drug evaluation.
2. Organoleptic Evaluation
3. Microscopical Evaluation
4. Chemical Evaluation
5. Physical Evaluation
6. Biological Evaluation
7. DNA based methods

1. Organoleptic Evaluation:

Drug is studied with the help of sense organs. Every drug has its own colour, texture, odour, taste, shape and size. These properties of drug are studied by the sense organs and evaluated.

2. Microscopic Evaluation:

Microscopic characters of a plant are studied. These characters are such as tissue arrangement, cell wall structures, cell contents, starch grains, calcium oxalate crystals, trichomes, vessels etc. are studied. This method also includes quantitative microscopy such as

a. **Linear measurements:** which includes size of Starch grain, length and width of fibres, diameter, size, shape of stomata, phloem.

b. **Leaf Constants:** it includes stomatal number, stomatal index, vein termination number, palaside ratio. Every plants bares its unique features, characters which can be studied with the help of microscope help to identify and authenticate the drug.

3. Chemical Evaluation:

a. **Qualitative Chemical Tests:** Identification test for various phytochemicals such as alkaloids, glycosides, tannins etc.
b. **Quantitative Chemical Tests:** It includes tests like Acid value, Saponification value, Ester value, Acetyl value etc.
c. **Chemical Assay:** Assays for volatile oils, alkaloids, vitamins etc.
d. **Instrumental Assays:** For the analysis of chemical group of Phytoconstituents, Chromatographic and Spectroscopic methods are used.

i) Chromatographic methods:

I. Paper chromatography
II. Thin-layer chromatography
III. Gas chromatography
IV. High performance liquid chromatography
V. High performance thin layer chromatography

ii) Spectroscopic methods:

I. Ultraviolet and visible spectroscopy
II. Infrared spectroscopy
III. Mass spectroscopy
IV. Nuclear magnetic spectroscopy

4. Physical Evaluation

It includes various tests they are-

a. Solubility: Drug's typical reaction to specific solvent is used for determination. Solvents such as water, petroleum, ether, alcohol, chloryl hydrate etc, are used. Generally alkaloidal base are soluble in organic solvents and alkaloidal salts are soluble in polar solvents.
b. Optical Rotation: Rotation of orientation of plane-polarized light in anisotropic crystalline solidosis studied in this method. Drugs like Honey, Eucalyptus oil are studied under this property.
c. Refractive Index: "The property of material that changes speed of light computed as a ratio of the speed of light in a vacuum to the speed of light through the material", is known as refractive Index. it is used as a parameter for the evaluation of herbal drugs.
d. Specific Gravity: Specific gravity or relative density of drug is studied for the evaluation.
e. Viscosity: Viscosity i.e. resistance of fluid flew is constant at specific temperature and works as an index of composition. It is a parameter used for drug evaluation.
f. Melting Point: Range of melting point is fixed, it is used as parameter of evaluation of drug.

g. Moisture Content: Moisture in a drug causes decomposition of it due to chemical changes or microbial growth. It is important to evaluate moisture in drug for its authentification.
h. U-V lights: - Property of certain drugs which cut surface fluoresces when exposed to UV lights, is used to determine the variety of species of drug as it shows marked differentiations in fluorescence.

Ash Value: Useful to determine inferior drug quality. Detection of exhausted drug, excess sandy or earthy material, or admixtures is performed.

Extractive Values: For the approximate measurement of chemical constituents these tests are performed. It includes

I. Water soluble Extracts - for glycosides, tannins.
II. Alcohol soluble Extracts -for resins, tannins
III. Ether soluble Extract - for fats and volatile oils

i. Foreign organic matter: Drug can be contaminated due to insects, modules, animal extracts etc, and such impurities can compromise the quality and efficacy of drug. Each herbal drug has been mentioned with a limit of foreign matter it may contain and the drug used for medicinal purpose should be in these limits.

5. Biological Evaluation

This kind of evaluation is performed when chemical and physical evaluations are not sufficient. Pharmacological activities, potency and toxicity of drug are examined.

Types of Bioassay

I. Toxic
II. Symptomatic
III. Tissue or organ method
IV. Microbiological assays- Used to determine the effect of drug on microorganisms like bacteria, fungi and is applied for the identification of anti-microbial drugs.

6. DNA Based Methods:

DNA i.e. genetic composition of plant or drug in constant and it does not get affected by physical or environmental changes.

DNA based methods can be used as empowering techniques to conventional methods of drug evaluation. There are 2 types of this technique

I. Non- targeted DNA Finger printing
II. Sequence- based methods -DNA Barcoding

CONCLUSION:

All the methods or techniques either conventional or modern are important for drug identification and authentification. Due to these various evaluation techniques the drug used for medicinal purpose or research purpose is determined in respect to its quality, purity, and efficacy.

This article may get helpful for the students and research scholars in their studies and further vision in research field.

REFERENCES:

[1] Textbook of Pharmacognosy and Phytochemistry-by-Biren N.Shah, A.K.Seth, ELSEVIER Publication 1st edi. Pdf copy by studyfrnd.com
[2] Pharmacognosy -J.S. Qadri, B. S. Shah Prakashan,12th edi. 2004-2005
[3] www.redearchgate.net>
[4] www.jiwaji.edu>pdf>ecourse
[5] www.simplepharmanotes.com

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