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GENOMOLECULAR SYSTEMATICS FOR THE AUTHENTICATION OF HERBAL PRODUCT/S

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ABSTRACT:

Use of indigenous drugs from plant origin forms a major part of complementary and alternative medicine/traditional medicine. These drugs need proper standardization and have to be accurate i.e. should be free from intentionally or unintentionally adulteration. Current focus on chemotype-driven fingerprinting and related techniques requires integration with genotype-driven molecular techniques. So, that an optimal characterization of botanical materialism is possible. Genetically validated and technologically standardized herbal medicines may be derived using a safe path of pharmacological approach based on traditional knowledge database.

KEYWORDS: *Indigenous drugs, adulteration, Genomolecular techniques.*

INTRODUCTION:

With the onset of modern voyage the diseases are more pertaining as compared to the combating methods. The number of patients has increased dramatically due to the changes in lifestyle, increasing prevalence of obesity etc. Traditional and rational drug discovery methods are hiking and have been proved that traditional medicines provide better health coverage for 80% of the world population, especially in the developing countries. Depending on synthetic drugs has led to the curse of side effects bursting into severe complications leading to the series of medication. To overcome this phase patients are now more inclined towards phyto-pharmaceuticals / herbal products to control these ailments. These herbal medicines, however, suffer from a range of shortcomings which include adulteration, insufficient and unacceptable evidences of safety, efficacy, standardization, and inconsistent production practices. Therefore, a care is required from the identification and authentication of herbal raw materials to the verification process of final product. The substitution of herb arises because of similar / wrong identification or the use of cheaper alternatives. Assessment of the safety of these herbal products, therefore, is the first priority in herbal research. There are various approaches for the evaluation of safety of such phyto-medicines. WHO recommends pragmatic approach to overcome the difficulties in contaminants in herbal medicine-substitution and misidentification of herbs. In these products morphological or anatomical identification is not possible so has to be identified only through

utilizing biochemical or genomic methods. The use of chromatographic and spectroscopic techniques and marker compounds to standardize botanical preparations has limitations because of their variable sources and chemical complexity. Assessment of phytochemical and genetical data reveals more significant application of latter. In case of chemical screening an ambiguity persists as closed allies have same active constituents but they differ quantitatively and hence are used for adulteration as they have low cost. Among genomic methods DNA-based methods are utilized utmost. Genomic fingerprinting provides a clear demarcation between species and hence serves as a powerful tool to detect the homogeneity of the samples and presence of adulterants.

METHODS:

Authentication of herbal drugs-

As macroscopic observations (traditional taxonomical tools) are viable only if a plant/plant part/s is present and therefore, it cannot be deployed for prepared herbal drugs. So, authentication of such preparation depends on-

Microscopic observations -It involves microscopic inspection of plant parts the original material.

Phyto-chemical screening- It includes use of chromatographic and spectroscopic techniques and forms a valuable tool for the qualitative determination of small amounts of impurities. As plants are obtained from variable sources and they are influenced by various extrinsic and intrinsic factor/s which effect partial qualitative and quantitative secondary metabolites therefore there chemical array varies. Hence chemical profile of a single species can vary. So to ensure efficacy selection of the correct chemotype becomes necessary. This variable, forms limitations of phyto-chemical screening.

Genome based screening – Genomic material is generally inert with very low rate of alteration / mutation so it can be employed as a marker for the authentication of medicinal plant. DNA can be extracted from fresh or dried organic material / tissue and subjected to various types of DNA-based molecular techniques. These techniques include-

1. Hybridization-based methods;
2. Polymerase chain reaction (PCR)-based methods
3. Sequencing-based methods

Most commonly applied methods include- RFLP (or Restriction fragment length polymorphism), RAPD (or Random amplification of polymorphic DNA) TRFP (or Terminal restriction fragment methods), AFLP (or Amplified fragment length polymorphism), VNTR (or Variable number tandem repeat) , SNP (or Single nucleotide polymorphism), STR (or Short tandem repeat), DNA barcoding, Micro satellite polymorphism, SFP (or Single feature polymorphism), Inter-simple

sequence repeats (ISSR), Internal Transcribed Spacer (ITS) Sequences and SNP genotyping assays.

RESULT AND DISCUSSION:

The World Health Organization (WHO) recognized the fact in the early 1970s that traditional medicines, largely herbal in nature, are regarded as important but underutilized tools against disease and are therefore, encouraged by governments to effectively utilize local knowledge of herbal medicines for disease prevention and health promotion. Herbal products are defined as herbal materials that are administered to patients and are mixtures of herbal substances and other constituents. Herbal medicines, however, suffer from a range of shortcomings. These include insufficient and unacceptable evidences of safety, efficacy, standardization, and inconsistent production practices. The scientific evaluation of safety and efficacy of herbal products and medicinal preparation is thus of vital importance from both therapeutic and economic perspectives.

Advantages of Genomolecular techniques:

- Identification of genetic variants / Genotyping.
- Differentiation of closely related species.
- Authentication of prescribed plants.
- Detection of adulterant.
- Selection of better chemotypes. If deployed along with phyto-chemical screening, quantitative estimates can be verified'
- Bio-assay can open new vistas for novel drugs.

Future prospects:

Will help to check adulteration

- Quality herbal products will be feasible with low side effect risk for the welfare of the society.

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