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ADVANCED HERBAL TECHNOLOGY

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ABSTRACT
Recently people are getting attracted towards herbal medicines due to many advantages. Herbal formulations have reached extensive acceptability as therapeutic agents for several diseases. Although most of these applications are unorthodox, it is however a known fact that over 80% of the world population depends on herbal medicines and products for healthy living. This is a development in the use of herbal product has again given height to various forms of misuse and impurity of the products leading to consumers' and manufacturers' dissatisfaction and in some instances fatal effects. The numerous convectional approaches and more recent advancements are covered in the current review article. Recent developments have been noted in areas such as DNA fingerprinting, metabolomics, differential pulse polarography, chemometrics, X-ray diffraction, etc. Contributions of chromatographic and capillary electrophoresis techniques to the standardisation of herbal medicines are also reported.

KEYWORDS: Standardization, Herbal Drug, DNA Fingerprinting, Chromatographic Techniques.

INTRODUCTION

Herbal medicines are the oldest remedies known to mankind. herbs have been used by all cultures throughout history but India has one of the oldest richest and most diverse culture living traditions associated with use of medicinal plants. The use of herbs as medicine is the oldest form of healthcare known to humanity and has been used in all cultures throughout history.[1]

Chromatography is the analytical techniques use for separation, purification, identification of constituents from the mixture. This works on the principle of differential interaction of solute with two different phases (stationary phase and mobile phase). In this technique number of compound can be detected. They administer the mixture to be separated in a stationary phase (solid or liquid) and a pure solvent such as water or any mixed gas(mobile phase) is allowed to move slowly over the stationary phase, holding the components separately in the pure solvent as per their solubility.[2]

Many communities worldwide have been using medicinal plants in their healthcare systems from time immemorial. As far as Africa is concerned, medicinal plants are still a principal component of the traditional healthcare system and may be the earliest and the most robust of all curative entities.[3]

Research on finding novel drugs in medicinal plants involves screening the plant extracts for new compounds and then conducting biological activity tests. Suspected new molecules or bioactive compounds are then isolated and purified for molecular structure elucidation and further pharmacological or toxicological tests.[4]

The major drawback of modern medicines is their side effects which may lead to life threatening of patients. Herbal drugs also have their list of side effects like any other synthetic drugs. There are at least 120 distinct chemical substances derived from plants that are considered as important drugs currently in use in the world, while several other drugs are simple synthetic modifications of the natural products.[5]

Herb identification: What is this herbs?
Most people know the names of a few fresh herbs that are most commonly used in recipes. Basil, thyme and rosemary have quite a distinctive look so it's easy to remember what they are Herbal medicinal materials have been used worldwide for maintain health and to treat disease. Identification of herbal medicinal materials by DNA technology has been widely used, started from the mid-1990s. The basic resources of medicines comes from nature. They are used medicaments from ancient time.[6]

Now a days peoples are getting attracted towards herbal medicines due to many advantages. Herbal formulations have attained extensive acceptability as medicinal agents for several diseases. Although, most of these applications are unnatural, it is however a known fact that over 80% of the world population counts on herbal medicines and development for healthy living. This growth in the use of herbal product has also given rise to various forms of misuse and adulteration of the products leading to consumers' and manufacturers' disappointment and in some instances fatal consequences.[7]

An herbalist is a person who works with plants, particularly medicinal plants. The use of plants to treat disease is covered in herbal journals.[8]

Crude Plant Material: The botanical description, including genus, species and sovereignty, description, part of the plant, vigorous and characteristics elements should be determined and, if possible scope limits should be specified. Unfamiliar matter, adulterant and microbial content should be clarified or limited. Voucher examples, representing each lot of plant material processed, should be ascertained by a qualified botanist and should be reserved for at least a 10-year period. A lot digit should be assigned and this should occur on the product title.[9]

Plant Preparation: The manufacturing method should be characterized in detail. If other implications are added during manufacture in order to modify the plant preparation to a specific level of active or factors members or for any other goal, the additional substances should be mentioned in the manufacturing methods.[10]

Different method of identification of plant

(1). Expert Determination: The best method of identification is expert determination in terms of reliability or accuracy. In general the experts have prepared treatments (monographs, revisions, synopses) of the group in question, and it is probable that the more recent floras or manuals include the expert's concepts of taxa. Experts are typically found in botanical gardens, herbaria, museums, colleges, universities, etc. However, although of great reliability, this method presents problems of requiring the valuable time of experts and creating delays for identification.[11]

(**2) Recognition:** The best method of identification is skillful determination in words of trustworthiness or accuracy in public the professional have formulated medications (monograph, revision, synopses) of the group in question, its possible that the better current fluors or florus or manual include the expert idea of taxable.[12]

Identification and Authentication of Herbal Drug

Macroscopy: Macroscopy involves checking external look or sensory characters Like color odor, taste, size, shape, fracture etc. botanic identification of herb is usually done By trained person like biologist. For proper botanic identification, entire plant at the side of root And flower is required. Botanic identification is predicated on morphology that involves checking Various elements of herbs like leaves, flower, root et al. Leaves and flowers virtually vital Parts that facilitate in identification of plant. Herb will be ascertained for color size, shape and Arrangement of leaves and flower. Arrangement of leaves on stem AN branching is termed Phyllotaxy. Differing types of arrangement of leaves like alternate distichous, opposite, Decussate, whorled varieties of leaves arrangement will be useful to spot herb properly.[13]

Microscopy: They focuses on anatomical structures in the plant material that are visible only with the help of a microscope. Features such as trachoma (hair) shape and structure, the arrangement of stomata in the epidermis, the presence or absence of compounds such as mucilage, starch or lignin, or the presence of tissues with characteristic cells might be used in the microscopic identifications of herbal drugs.[14]

Phytochemistry:- once macro and research, preliminary phytochemical analysis helps To identify plant. Preliminary phytochemical analysis helps to reveal chemical constituents. Also analytical techniques ar wont to establish marker compound that is {particular} to particular Herb. UV, MASS, NMR, HPLC, HPTLC ar habitually employed in trade for identification of Herbs.[15]

DNA Fingerprinting:-Use of biotechnological tools for correct identification of herbs is the upcoming latest technology. Molecular markers like RAPD, 1SSR, RFLP uses DNA fingerprinting for identification of herb at molecular level. Molecular markers are nothing but sequence of DNA which is unique to each plant. First, plant DNA is isolated and then amplified with the help of PCR and then screened for similar and different patterns. Plants also have DNA patterns similar to human. Pattern of this DNA can be identified in the for barcoding or DNA fingerprinting.[16]

Concept of standardization of drug

Standardization of herbal medicines is the process of prescribing a set of standards or inherent characteristics, constant parameters, definitive qualitative and quantitative values that carry an assurance of quality, efficacy, safety and reproducibility. It is the process of developing and agreeing upon technical standards. Specific standards are worked out by experimentation and observations, which would lead to the process of prescribing a set of characteristics exhibited by the particular herbal medicine. Hence standardization is a tool in the quality control process. 9-10 The authentication of herbal drugs and identification of adulterants from genuine medicinal herbs are essential for both pharmaceutical companies a swell as public health and to ensure reproducible quality of herbal medicine.[17]

Chromatographic Techniques In Herbal Drug Analysis

1) Column Chromatography

Column chromatography in chemistry is a chromatography method used to isolate a single chemical compound from a mixture. Chromatography is able to separate substances based on differential adsorption of compounds to the adsorbent; compounds move through the column at different rates, allowing them to be separated into fractions. The technique is widely applicable, as many different adsorbents (normal phase, reversed phase, or otherwise) can be used with a wide range of solvents. The technique can be used on scales from micrograms up to kilograms. The main advantage of column chromatography is the relatively low cost and disposability of the stationary phase used in the process. The latter prevents cross contamination and stationary phase degradation due to recycling. Column chromatography can be done using gravity to move the solvent, or using compressed gas to push the solvent through the column.[18]

2) High Performance Thin Layer Chromatography (HPTLC)

HPTLC technique is widely employed in pharmaceutical industry in process development, identification and Detection of adulterants in herbal product and helps in identification of pesticide content, mycotoxins and in quality Control of herbs and health Food. It has been well reported that several samples can be run simultaneously by use of A smaller quantity of mobile phase than in HPLC. It has also been reported that mobile phases of pH 8 and above Can be used for HPTLC. Another advantage of HPTLC is the repeated detection (scanning) of the chromatogram With the same or different conditions. Consequently, HPTLC has been investigated for simultaneous assay of several Components in a multicomponent formulation. With this technique, authentication of various species of plant is Possible, as well as the evaluation of stability and consistency of their preparations from different manufactures. Various workers have developed HPTLC method for phytoconstituents in crude drugs or herbal formulations suchas Bergenin, catechine and gallic acid in Bergenia cilliata and Bergenia lingulata.[19]

3) Paper Chromatography

The solvent penetrates the paper by capillary action and, in passing over the sample spot, carries along with it the various components of the sample. The components move with the flowing solvent at velocities that are dependent on their solubilities in the stationary and flowing solvents. Separation of the components is brought about if there are differences in their relative solubilities in the two solvents. Before the flowing solvent reaches the farther edge of the paper, both solvents are evaporated, and the location of the separated components is identified, usually by application of reagents that form coloured compounds with the separated substances. The separated components appear as individual spots on the path of the solvent. If the solvent flowing in one direction is not able to separate all the components satisfactorily, the paper may be turned 90° and the process repeated using another solvent. Through capillary action, the solvent permeates the paper and, as it passes over the sample spot, carries the various components of the sample with it. Depending on how soluble each component is in the stationary and moving solvents, the components move with the flowing solvent at different speeds. If the components' respective solubilities in the two solvents differ, separation of the components results. Both solvents evaporate before the flowing liquid reaches the farther end of the paper, and the separation of the components is then recognised by applying reagents that produce coloured compounds with the separated substances. On the solvent's journey, the divided components can be seen as distinct patches. If the solvent is incapable of flowing in one direction.[20]

4) Thin Layer Chromatography

Chromatography is a technique used to extract and study biomolecules from a complicated combination. A stationary phase and a mobile phase make up this separation process. The combination that needs to be separated makes up the mobile phase and passes through the stationary phase. Solid-liquid, liquid-liquid, or gasliquid phases are all possible for these two phases. A polar absorbent serves as the stationary phase in thin layer chromatography (TLC), a solid-liquid form of chromatography in which the mobile phase can be either a single solvent or a mixture of solvents. Chromatography is a technique in which compounds in a mixture are separated based on differing affinities between a mobile phase and a stationary phase.[21]

Standardization of Herbal Drugs: Quality control of herbal medicines is a tedious and difficult job. Commercialization of the manufacture of these medicines to meet their increasing demand has resulted in a decline in their quality and also primarily due to a lack of adequate regulations pertaining to this sector of medicine. The need of the hour is to evolve a systematic approach and to develop well-designed methodologies for the standardization of herbal raw materials and herbal formulations.[22]

Drugs for Advance Technology

a) Jasmine (Jasminum)

When you inhale the molecules from jasmine, your body receives messages from the limbic system which is Responsible for influencing the nervous system. You can have jasmine in your room as a plant to relieve your Anxiety and depression systems or use it as an essential oil to put in a diffuser to catch the scent. As well as Anxiety and depression, jasmine can also improve your focus, help with sleeping, balance hormones, and Lower your risk of infection. This shows that the jasmine plant is multi function and can help improve your Quality of life.[23]

b) Shankpushpi (Convolvulus Pluricaulis)

Shankhpushpi, clad by the vernacular names Shankhini, Kambumalini, Samkhapushpi, Sadaphuli, and Sankhaphuli may be a potent memory booster and brain tonic that Actively works to enhance intelligence and functioning of the brain. The name shankhpushpi Was given to the plant thanks to its shankh or univalve formed flowers. It conjointly helps in enhancing Concentration, learning capabilities, mental fatigue, insomnia, stress, anxiety, depression, etc. It improves mental state and would possibly facilitate in managing depression because of its medication Activity. in keeping with piece of writing, Shankhpushpi helps to quiet down the brain and relieve stress furthermore as anxiety. It conjointly improves memory by acting as a brain tonic because of its Madhya (improves intelligence) property. you'll be able to take Shankhpushpi powder along side heat milk Or water to assist boost memory and concentration. Shankhpushpi tablets and capsules can even be wont to improve brain functions. Shankhpushpi sweetener is associate ayurvedic remedy for Memory and brain. it's helpful in mental weakness, forgetfulness, cognitive state, low Retention power etc. However, medicines or supplements will solely improve alertness, span, brain functions, nerve coordination and brain's retention capability, however these Supplements might not amendment your habits of procrastination. Therefore, daily brain exercises also are needed to spice up brain capabilities.[24]

Application of herbal drug technology

Herbal Remedies for Psoriasis Diseases Psoriasis is undoubtedly distressing and topical treatments using herbal remedies are able to overcome the adverse and antagonistic effects and also improve the bioavailability of drugs. Herbals drugs like Aloe, Cayenne, Chamomile, Dong Quai, Emu oil, Evening primrose oil, Fish oil, Tea tree oil, Turmeric, Slippery elm, Wintergreen, Shark cartilage, Milk thistle, Glucosamine, Flaxseed oil are generally used for the treatment of psoriasis.[25]

Herbal drugs for disorders caused by "cellphones" Radiation from cell phones and telephone towers can cause health problems such as brain tumors, cancer, infertility, memory loss, depression, sleep and behavior problems. Long-term exposure to cell phone radiation affects the body, particularly the electrical organ, brain. Now-a-days herbal drugs are widely used in the curing of disorders caused by cellphones. Drugs like Radix Curcume, Herba Agrimonia and Fructus Aurantii are collectively marketed under the tradename "Canelim Capsules" which are used in Brain Cancer. Other drugs viz. Hypericum perforatum, Passiflora, Valerian, Lemon balm tea, etc are used in curing insomnia.

Polyherbal Therapies In the past decade there has been a paradigm shift from single- target drugs to multi-target drugs. Multitarget approaches are directed towards the activation of defense, protective and repair mechanisms of the body rather than destruction of the damage-causing agent. This may be achieved by the use of a combination of drugs. The concept of multi-targeted therapy exists in traditional medical treatments that employ multi-component extracts of natural products which simultaneously act on multiple targets. They have the synergistic, potentiative, agonistic/antagonistic pharmacological agents within themselves that work together in a dynamic way to produce therapeutic efficacy with minimum side effects. Phytosomes are a new concept in herbal delivery systems. Complexing the polyphenolic phytoconstituents in molar ratio with phosphatidylcholine results in a new herbal drug delivery system- "Phytosome". The term "phyto" means plant while "some" means cell-like. Phytosomes are advanced forms of herbal products that are better absorbed, utilized, and as a result produce better pharmacokinetic and therapeutic profile than conventional herbal extracts. Clinical trials of phytosomes have shown an increase in bioavailability of herbal extracts. Phytosomal drug delivery system is mainly used to deliver systemic antioxidants (mainly flavonoid and terpenoid component) and also used to treat the disease like blood pressure, liver disease, cancer, skin disease and to protect the brain lining.

DNA Microarrays in Herbal Drug Technology And Research: The DNA Microarray (DNA arrays, gene chips or biochips) is an orderly arrangement of thousands of oligonucleotides or identified sequenced genes printed on an impermeable solid support, usually glass, silicon chips or nylon membrane. DNA microarrays provide a revolutionary approach to the investigation of gene expression, serve as suitable high throughput tools for simultaneous analysis of multiple genes and thus play an essential role in quality control of herbal drugs and extracts. In natural products a broad report is of chemical entities acting together on multiple targets that makes it necessary to study the changes in expression of multiple genes simultaneously. Three main applications of DNA microarrays are as follows: In pharmacodynamics: For discovery of new diagnostic and prognostic indicators and biomarkers of therapeutic response; elucidation of molecular mechanism of action of a herb, its formulations or its phytochemical components and identification and validation of new molecular targets for herbal drug development.[25]

CONCLUSION

Plants, herbs, and ethnobotanicals are used since the first days of mankind and area unit Still used throughout the globe for health promotion and treatment of sickness. Plants and Natural sources kind the idea of nowadays's fashionable drugs and contribute for the most part to the industrial drug preparations factory-made today. Regarding twenty fifth of medication prescribed Worldwide area unit derived from plants. Still, herbs, instead of medication, area unit usually utilized in health Care. For some, flavorer drugs is their most popular methodology of treatment. For others, herbs area unit Used as adjunct medical aid to traditional prescribed

drugs. However, in several developing Societies, ancient drugs of that flavorer drugs may be a core half is that the solely system of Health care out there or reasonable. Despite the rationale, those mistreatment flavorermedicines ought to be assured that the product {they area unit|they're} shopping for are safe and contain what they're purported to, whether or not this is often a specific herb or a specific quantity of a particular flavorer element. Customers ought to even be given science-based data on dose, Contraindications, and effectuality. To attain this, world harmonization of legislation is required To guide the accountable production and promoting of flavorer medicines. If decent scientific proof of profit is on the market for Associate in Nursing herb, then such legislation ought to leave this to be used fittingly to market the employment of that herb so these advantages are often realised for the promotion of public health and therefore the treatment of sickness.

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