



Advance herbal technology

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Abstract

Recently peoples 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 product for healthy living. This rise in the use of herbal product has also given rise to various forms of abuse and adulteration of the products leading to consumers' and manufacturers' disappointment and in some instances fatal consequences. The development of authentic analytical methods which can reliably profile the phytochemical composition, including quantitative analyses of marker/bioactive compounds and other major constituents, is a major challenge to scientists. Standardization is an important step for the establishment of a consistent biological activity, a consistent chemical profile, or simply a quality assurance program for production and manufacturing of herbal drugs. In present review article various convectional methods as well as newer advances are described. Recent advancements includes DNA fingerprinting, metabolomics technique, differential pulse polarography, chemometric, X-ray diffraction...etc are observed. Capillary electrophoresis and chromatographic techniques contributions towards standardization of herbal drugs is also reported.

Key Words: Standardization, herbal drug, DNA fingerprinting, chromatographic techniques

Objective

- 1.Understand raw material as source of herbal drugs from cultivation to herbal drug product
- 2.Know the WHO and ICH guidelines for evaluation of herbal drugs
- 3.Know the herbal cosmetics, natural sweeteners, nutraceuticals
- 4.Appreciate patenting of herbal drugs, GMP.

Introduction of herbal technology

Medicine is a substance that has nutritive, curative, or preventive properties, while the term "herbal" refers to a botanical or plant-based preparation. Hence, the term "herbal medicine" is used for plantbased substances that consist of nutritive, curative, or preventive properties. Herbal medicine is an interdisciplinary branch between herbal medicine and Ayurveda as it covers all fields of herbal medicine related to botany, medicinal plant research, pharmacognosy, phytochemistry, phytotherapy, botanical medicines, Ayurveda, natural chemistry, agriculture science, Unani medicine, biotechnology, and biochemistry. A person who deals with herbs, especially medicinal herbs, is known as an herbalist. Herbal journals deal with the use of plants in the treatment of diseases.

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.

(2) Recognition: It approaches expert determination in reliability. This is based on extensive, past experience of the identifier with the plant group in question.

(3) Comparison: A third method is by comparison of an unknown with named specimens, photographs, illustrations or descriptions. Although this is a reliable method, it may be very time consuming or virtually impossible due to the lack of suitable materials for comparison.

(4) The Use of Keys and Similar Devices (Synopses, Outlines, etc.): This is by far the most widely used method and does not require the time, materials, or experience involved in comparison and recognition.

Authentication of plant

Herb authentication is a quality assurance process that ensures the correct plant species and plant parts are used as raw materials for herbal medicines. The proper authentication of herbal raw materials is critically important to the safety and efficacy of herbal medicines.

Macroscopic examination involves the comparison of morphological characters that are visible with the naked eye or under low magnification with descriptions of the plant or botanical drug in floras or monographs. Characters such as size, shape and colour of leaves (or leaf fragments), flowers or fruits are commonly used in macroscopic identification.

Microscopic examination focuses on anatomical structures in the plant material that are visible only with the help of a microscope.

Features such as trichome (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.

Chromatography is the separation of chemical compounds in a mixture. A number of chromatographic techniques exist, but all are based on the same basic principles.

Thin-layer chromatography (TLC) is widely employed in herbal authentication, and the majority of pharmacopoeial monographs for herbs include a TLC identification test. TLC separates mixtures of compounds to leave a 'fingerprint' of separated compounds on a plate coated with silica gel. This fingerprint can be compared with that of an authentic sample or pure reference compounds.

High-performance liquid chromatography (HPLC) is another type of chromatography widely used in the authentication and analysis of herbal substances. Yet another type, gas chromatography, is used in particular for essential oils and fatty acids.

Different extraction methods including advanced extraction techniques like supercritical fluid

Extraction can be defined as the removal of soluble material from an insoluble Residue, either liquid or solid, by treatment with a liquid solvent. It is therefore, a solution Process and depends on the mass transfer phenomena. The controlling factor in the rate of Extraction is normally the rate of diffusion of the solute through the liquid boundary layer at The interface. The principle methods of extraction are –

- Maceration
- Percolation
- Digestion
- Infusion
- Decoction

Solvent extraction also known as liquid-liquid extraction and partitioning, is a Method to separate compounds based on their relative solubilities in two different Immiscible liquids, usually water and an organic solvent. It is an extraction of a substance From one liquid phase into another liquid phase. It is a basic technique in chemical Laboratories, where it is performed using a separatory funnel. In other words, this is the Separation of a substance from a mixture by preferentially dissolving that substance in a Suitable solvent. Solvent extraction may be made use analytically for concentrating or Rejecting a particular substance, or for the separation of mixtures. This process usually Separates a soluble compound from an insoluble compound. Solvent extraction is used in Nuclear processing, ore processing, production of fine organic compounds, processing of Perfumes and other industries.

Supercritical fluid extraction = Often the analysis of complex materials requires, as a preliminary step that is, Separation of the analyte or analytes from a sample matrix. Ideally, an analytical separation Method should be rapid, simple and inexpensive; should give quantitative recovery of Analytes without loss or degradation; should yield a solution of the analyte that is sufficiently Concentrated to permit the final measurement to be made without the need for concentration; Should generate little or no laboratory wastes that have to be disposed off. For many years, one of the most common methods for performing analytical separations on complex environmental, pharmaceutical, food and petroleum samples was Based upon extraction of bulk samples with hydrocarbon or chlorinated organic solvents Using a Soxhlet extractor. Unfortunately, liquid extraction frequently fails to meet several of The ideal criteria.

Supercritical fluid

A supercritical fluid is any substance at a temperature and pressure above its critical Point. It can diffuse through solids like a gas, and dissolve materials like a liquid. Additionally, close to the critical point, small changes in pressure or temperature result in Large changes in density, allowing many properties of a supercritical fluid to be “fine-tuned”. Supercritical fluids are suitable as a substitute for organic solvents in a range of industrial And laboratory processes. Carbon dioxide and water are the most commonly used Supercritical fluids, being used for decaffeination and power generation, respectively. CO₂ is The kind of extraction solvents for botanicals. It leaves no toxic residue behind. Its extraction Properties can be widely and precisely manipulated with subtle changes in pressure and Temperature.

Extraction

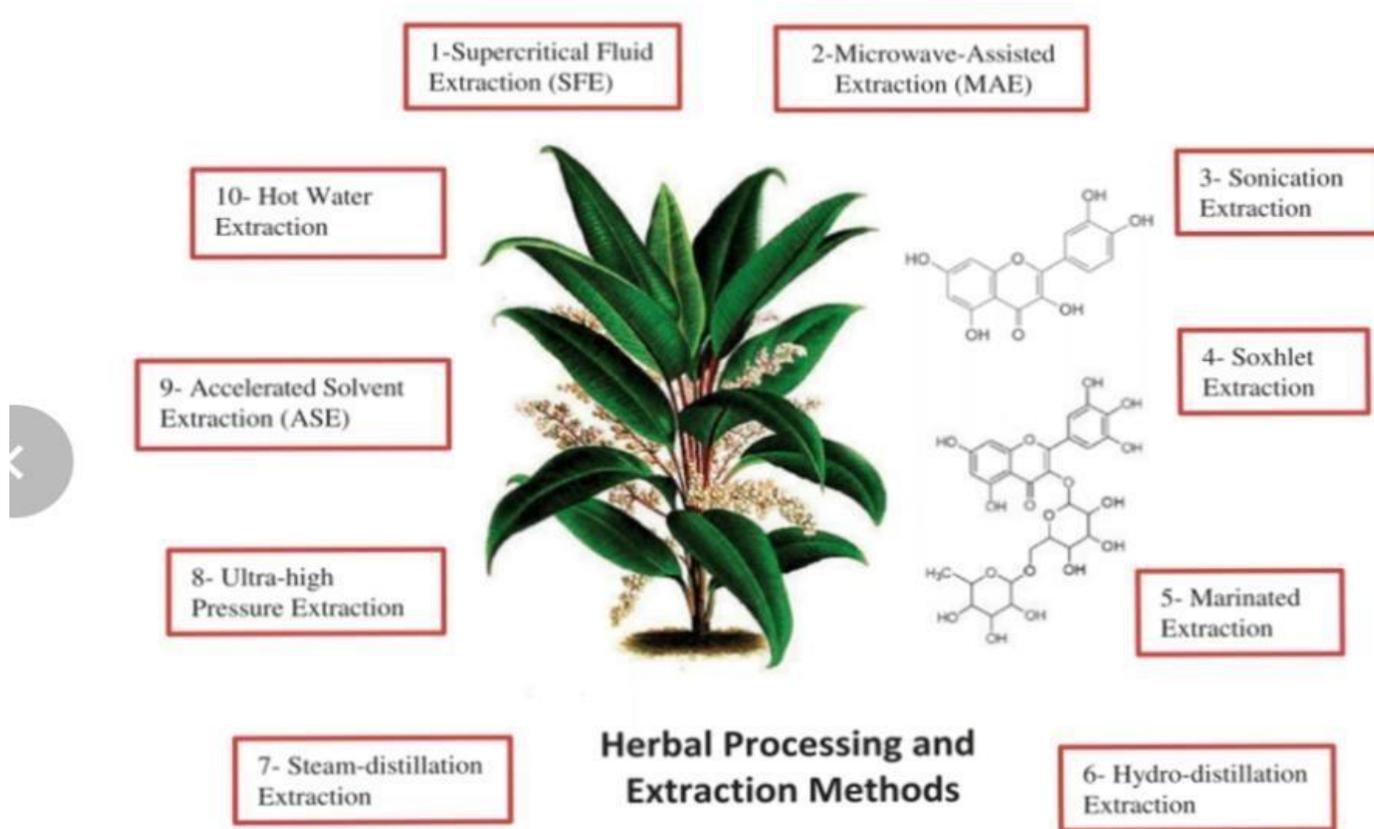


FIGURE 1 The 10 extraction methods described in the text.

Microwave assisted extraction

Principle of microwave assisted extraction

Microwaves are part of electromagnetic spectrum of light with a range of 300 MHz to 300 GHz and wavelengths of these waves range from 1cm to 1m (Mandal et al., 2007). These waves are made up of two perpendicular oscillating fields which are used as energy and information carriers. First application of microwaves includes its interaction with the specific materials which can absorb a part of its electromagnetic energy and can convert it into heat. Commercial microwaves use 2450 MHz of energy for this purpose which is almost equivalent to 600-700W (Afoakwa et al., 2012)

Ultrasound assisted extraction

Extraction has been used probably since the discovery of fire. Egyptians and Phoenicians, Jews and Arabs, Indians and Chinese, Greeks and Romans, and even Mayas and Aztecs, all possessed innovative extraction and distillation processes used even for perfumes, cosmetics or food.

Nowadays, we cannot find a production line in food, pharmaceutical, cosmetic, nutraceutical, or bioenergy industries, which do not use extraction processes, such as (maceration, solvent extraction, steam or hydro-distillation, cold pressing, squeezing...). With the increasing energy costs and the drive to reduce greenhouse gas emissions, food and plant-based chemical industries are challenged to find new technologies in order to reduce energy consumption, to meet legal requirements on emissions, product/process safety and control, and for cost reduction and increased quality as well as functionality. For example, existing extraction technologies have considerable technological and scientific bottlenecks to overcome: often requiring up to

50% of investments in a new plant and more than 70% of total process energy used in food industries [1]. In the last two decades, these shortcomings have led to the consideration of the use of enhanced and efficient extraction techniques amenable to automation such as ultrasound-assisted extraction. Shorter extraction times, reduced organic solvent consumption, energy and costs saved, were the main tasks pursued. Driven by these goals, advances in ultrasound-assisted extraction have resulted in a number of innovative techniques such as ultrasound-assisted Soxhlet extraction, ultrasound-assisted Clevenger distillation, continuous ultrasound-assisted extraction, and combination of ultrasound with other techniques such as microwave, extrusion, and supercritical fluid extraction.

Isolation and purification technique

1) General isolation techniques

- 2) Extraction methods
- 3) Plant material extraction is a crucial process in the isolation of natural plant compounds and their purification.
- 4) Plant matrices naturally are complex, containing a wide range of compounds that have various physical and
- 5) chemical properties [8]. It is therefore imperative to carefully, isolate from the rest of the plant, matrices and
- 6) make pure, compounds of interest in plants for their characterization. There are several ways extraction methods
- 7) can be categorized [9]. In this chapter, they have been categorized based on the temperatures they work under.
- 8) 2.1 Low or room Temperature methods
- 9) 2.1.1 Cold extraction method
- 10) The method has been described in literature [10, 11]. Briefly, dried plant parts samples (Cut, crushed or milled)

2) chromatographic technique

INTRODUCTION

People on all continents have used hundreds to thousands of indigenous plants for treatment of ailments since prehistoric times. Many plants synthesize substances that are useful to the maintenance of health in humans and other animals. These include aromatic substances, most of which are phenols or their oxygen-substituted derivatives such as tannins [1]. Sick animal tend to forage plants rich in secondary metabolites, such as tannins and alkaloids. Since these phytochemicals often have antiviral, antibacterial, antifungal and anthelmintic properties, a plausible case can be made for self-medication by animals in the wild [2]. According to an estimate of the World Health Organization (WHO), about 80% of the world population still uses herbs and other traditional medicines for their primary health care needs. Herbal medicine products are dietary supplements that people take to improve their health and are sold as tablets, capsules, powders, teas, extracts and fresh or dried plants. Herbals are traditionally considered harmless and increasingly being consumed by people without prescription.

**Classical**

Yield of extraction

Type of metabolites

Selectivity

intensification

**Today's**

Reduction of solvent used

Reduction of unit operations

Reduction of extraction time

Reduction in energy used

Use of renewable plant resources

Security and safety

Environmental impact

Rapid return of investment (ROI)

CHROMATOGRAPHIC TECHNIQUES IN HERBAL DRUG ANALYSIS

Chromatography represents the most versatile separation technique and readily available. Chromatography is Defined as technique of isolation and identification of components or compounds or mixture of it's into individual Components by using stationary phase and mobile phase. Plant materials are separated and purified by using various Chromatographic techniques. Herbal medicine is a complicated system of mixtures. Thus, the methods of choice for Identification of 'botanical drug' are mainly intended to obtain a characteristic fingerprint of a specific plant that Represent the presence of a particular quality defining chemical constituents. Chemical fingerprints obtained by chromatographic technique and especially by hyphenated chromatography, are Strongly recommended for the purpose of quality control of herbal medicines, since they might represent Appropriately the "chemical integrities" of the herbal medicines and therefore be used for authentication and Identification of the herbal products. Thin layer chromatography (TLC) and High Performance Thin Layer Chromatography (HPTLC)

Thin Layer Chromatography

Thin layer chromatography is simply known as TLC. It is one of the most popular and simple chromatographic Technique used of separation of compounds. In the phytochemical evaluation of herbal drugs, TLC is being Employed extensively for the following reasons:

1. It enables rapid analysis of herbal extracts with minimum sample cleanup requirement,
2. It provides qualitative and semi quantitative information of the resolved compounds.
3. It enables the quantification of chemical constituents. Fingerprinting using HPLC and GLC is also carried out in

Specific cases.

In TLC fingerprinting, the data that can be recorded using a high performance TLC (HPTLC) scanner includes the Chromatogram, retardation factor (Rf) values, the color of the separated bands, their absorption spectra, λ max and Shoulder inflection/s of all the resolved bands. All of these, together with the profiles on derivatization with different reagents, represent the TLC fingerprint profile Of the sample. The information so generated has a potential application in the identification of an authentic drug, in Excluding the adulterants and in maintaining the quality and consistency of the drug. TLC was the common method of choice for herbal analysis before instrumental chromatography methods like GC And HPLC were established. Even nowadays, TLC is still frequently used for the analysis of herbal medicines since various pharmacopoeias such As American Herbal Pharmacopoeia (AHP) , Chinese drug monographs and analysis, Pharmacopoeia of the People's Republic of China etc. still use TLC to provide first characteristic fingerprints of herbs . Rather, TLC is used as an easier method of initial screening with a semi quantitative evaluation together with other

Chromatographic techniques.

Sr. No.	Analyte	TLC System parameters
1.	<i>Harhra' (Terminaliachebula and Gallic acid)</i>	Stationary phase: Silica gel Mobile phase : Toluene – ethyl acetate – formic acid, 5:5:1
2.	<i>Azadirachta indica, Catharanthus roseus and Momordica charntia</i>	Stationary phase: Silica gel Mobile phase: Dichloro methane–methanol, 2:8
3.	<i>Mushroom extracts</i>	Stationary phase: Silica gel Mobile phase: Dichloromethane – ethyl acetate-methanol, 3:1:1
4.	<i>Strychnos nux vomica</i>	Stationary phase: Silica gel Mobile phase: Chloroform–ethyl acetate– diethyl amine, 0.5:8.5:1
5.	<i>Constituents from the fruit of Piper chaba (Piperine, piperamine, Piperlonnguminine, and methyl piperate)</i>	Stationary phase: Silica gel Mobile phase: n-hexane-ethylacetate, 1:1
6.	<i>Quinones</i>	Stationary phase: Silica gel 60 Mobile phase: dichloromethane-n-hexane, 8:2

3) 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 crosscontamination 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.

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*

Table 2: Example of mobile phase used in HPTLC for herbal compound

Over the past decades, HPLC has received the most extensive application in the analysis of herbal medicines. Reversed phase (RP) columns may be the most popular columns used in the analytical separation of herbal Medicines. Preparative and analytical HPLC are widely used in pharmaceutical industry for isolating and Purification of herbal compounds. There are basically two types of preparative HPLC: low pressure HPLC (typically Under 5 bar) and high-pressure HPLC (pressure >20 bar). The important parameters to be considered are resolution, Sensitivity and fast analysis time in analytical HPLC whereas both the degree of solute purity as well as the amount Of compound that can be produced per unit time i.e. throughput or recovery in preparative HPLC. In preparative HPLC (pressure >20 bar), larger stainless steel columns and packing materials (particle size 1030µm Are needed. The examples of normal phase silica columns are Kromasil 10 µm, Kromasil 16 µm, Chiralcel AS 20 µm whereas for reverse phase are Chromasil C18, Chromasil C8, YMC C18. The aim is to isolate or purify compounds, whereas in analytical work the goal is to get information about the sample. This is very important in pharmaceutical industry of today because new products (Natural, Synthetic) have to be introduced to the market as quickly as possible. Having available such a powerful purification technique makes it possible to spend less time of the synthesis conditions

High performance liquid chromatography (HPLC)

The separation principle of HPLC is based on the distribution of the analyte (sample) between a mobile phase (eluent) and a stationary phase (packing material of the column). Depending on the chemical structure of the analyte, the molecules are retarded while passing the stationary phase. The specific intermolecular interactions between the molecules of a sample and the packing material define their time "on-column".

Hence, different constituents of a sample are eluted at different times. Thereby, the separation of the sample ingredients is achieved.

A detection unit (e.g. UV detector) recognizes the analytes after leaving the column. The signals are converted and recorded by a data management system (computer software) and then shown in a chromatogram. After passing the detector unit, the mobile phase can be subjected to additional detector units, a fraction collection unit or to the waste. In general, a HPLC system contains the following modules: a solvent reservoir, a pump, an injection valve, a column, a detector unit and a data processing unit. The solvent (eluent) is delivered by the pump at high pressure and constant speed through the system. To keep the drift and noise of the detector signal as low as possible, a constant and pulseless flow from the pump is crucial. The analyte (sample) is provided to the eluent by the injection valve.

5) Purification techniques for isolated phytoconstituents

The separation of phytochemicals is a process of isolating the constituents of plant extracts or effective parts one by one and purifying them into monomer compounds by physical and chemical methods. Classical isolation methods, including solvent extraction, precipitation, crystallization, fractional distillation, salting-out, and dialysis, are still used commonly at present. On the other hand, modern separation technologies such as column chromatography, high performance liquid chromatography, ultrafiltration, and high performance liquid drop countercurrent chromatography also play an important role in the separation of phytochemicals. This section describes the common methods and their specific applications in isolation of phytochemicals.

Solvent method

Acid and basic solvent method

It is carried out according to the different acidity and alkalinity of each component in the mixture. Water-insoluble alkaline organic components, such as alkaloids, could react with inorganic acids and form salts, which can be separated from nonalkaline and water-insoluble components. Acid components with carboxyl or phenolic hydroxyl groups can be salted by bases and dissolved in water. Components with lactone or lactam substructures can be saponified and dissolved in water and then isolated from other water-insoluble components. The total extract can be dissolved in lipophilic organic solvents (ethyl acetate is commonly used) and extracted respectively with acid water and alkali water, and then the total extract would be divided into acidic, alkaline, and neutral parts. Of course, the total extract can also be dissolved in water and extracted with organic solvents after adjusting the pH value. The alkalinity or acidity of the fractions are different and can be separated further by pH gradient extraction.

When using the acid and basic solvent method, attention should be paid to the strength of acidity or alkalinity, the contact time with the separated components, heating temperature, and time, so as to avoid the structural changes of some compounds under severe conditions or the chemical structures cannot be restored to the original states.

Polarity gradient extraction method

This method is to achieve the separation aim based on the different polarity of each component in plant extracts and the different partition coefficients in two-phase solvents. Generally, different two-phase solvent systems are selected according to the polarity of components in plant extracts. For example, the components with strong polarity can be separated by n-butanol-water system, the components with medium polarity can

be separated by ethyl acetate-water system, and the components with weak polarity can be separated by chloroform (or ether)-water system. During the operation, the plant extract should be dissolved by water firstly, and then the solution or suspension is extracted in a separating funnel with different organic solvent which is not miscible with water based on the polarity difference. Usually, the extract was extracted with petroleum ether (or cyclohexane) firstly, then ethyl acetate (or chloroform), and finally with water saturated n-butanol, as shown in Figure 1. Petroleum ether layer contains lipid-soluble compounds with low polarity. Ethyl acetate layer contains medium polar compounds such as monoglycosides, flavonoids, and compounds with more polar functional groups. N-butanol layer contains compounds with strong polarity, such as oligoglycosides and other water-soluble components. Compounds in water layer possess strongest polarity, such as glycosides with more glycosyl groups, carbohydrates, amino acids, proteins, and other watersoluble compounds.

Precipitation method

It is a method based on the formation of precipitation of some phytochemicals by reaction with specific reagents, or the precipitation of some components from the solution by adding specific reagents, which can reduce the solubility of some components in the solution. The precipitation reaction must be reversible if the target components are required to form precipitation. While if the components are nontarget, the precipitation generated will be removed, so the precipitation reaction can be irreversible. According the addition of reagents or solvents, this method could be classified as follows onents in the mixed component solution can be changed by adding a specific solvent that can be mutually soluble with the solution, so it can be precipitated from the solution. The gradual precipitation by changing the polarity or amount of solvent added is called fractional precipitation. For example, using water as an extracting solvent to extract phytochemicals, ethanol is added to the water extracting concentrate to make its alcohol content more than 80%, and then polysaccharides, proteins, starch, gum, and so on will be precipitated and removed after filtration. The preceding procedure is called water extraction and ethanol precipitation. Crude polysaccharides from plants are often separated with this method

Importance of standardization

STANDARDIZATION OF HERBAL FORMULATION

Standardization of herbal formulation requires Implementation of Good Manufacturing Practices(GMP).In addition, study of various Parameters such as pharmacodynamics, Pharmacokinetics, dosage, stability, self-life, toxicity

Evaluation, chemical profiling o f the herbal Formulations is considered essential. Other factors Such as pesticides residue, aflatoxine content, heavy Metals contamination, Good Agricultural Practices (GAP) in herbal drug standardization are equally Important.

STANDARDIZATION OF POLYHERBAL FORMULATION

Standardization is an important aspect for Maintaining and assessing the quality and safety of The polyherbal formulation as these are combinations Of more than one herb to attain the desire therapeutic Effect. Standardization minimizes batch to batch Variation; assure safety, efficacy, quality and Acceptability of the polyherbal formulations . The Standardization of various marketed herbal and Polyherbal formulation Madhumehari Churna (Baidynath) containing the mixture

of eight Herbal. Dashamularishta, a traditional formulation, Used in the normalization of physiological processes After child birth. TLC and HPTLC fingerprint Profiles were used for deciding the identity, purity and Strength of the polyherbal formulation and also for Fixing standards for this Ayurvedic formulation.

STANDARDIZATION AND QUALITY CONTROL OF HERBAL CRUDE DRUGS –

PARAMETERS

According to WHO (1996a and b, 1992), Standardization and quality control of herbals is the Process involved in the physicochemical evaluation Of crude drug covering aspects, such as selection and Handling of crude material, safety, efficacy and Stability assessment of finished product, Documentation of safety and risk based on Experience, provision of product information to Consumer and product promotion. Attention is Normally paid to such quality indices such as:

Morphology and organoleptic evaluation: In case Of whole drug morphological characters are Important for differentiating purpose. It mainly Includes colour, odour, taste, shape, size etc. Detail Characteristics includes fractures, texture, venation Etc

Microscopic and histologic evaluation: These are Valuable in both whole as well as powdered drug. It Mainly includes study of characteristics like Parenchyma, trichomes, calcium oxalate crystals, Vascular bundle arrangements, stomata, fibres etc.

Quantitative microscopic study:

Microscopic Determination such as vein islet number, stomatal Index, stomatal number, vein termination number, Size of fibres, palisade ratio. Such study helps in Differentiation of closely allied species.

Physical evaluation:

study of various physical Parameters like moisture content, solubility, Viscosity, refractive index, melting point, optical Rotation, ash values, extractives and foreign organic Matter. size of fibres, palisade ratio. Such study helps in differentiation of closely allied species.

Physical evaluation:

study of various physical parameters like moisture content, solubility, viscosity, refractive index, melting point, optical rotation, ash values, extractives and foreign organic matter.

Qualitative chemical evaluation:

This covers identification and characterization of crude drug with respect to phytochemical constituent. It employs different analytical technique to detect and isolate the active constituents. Phytochemical screening techniques involve botanical identification, extraction

with suitable solvents, purification, and characterization of the active constituents of pharmaceutical importance

Quantitative chemical evaluation: To estimate the amount of the major classes of constituents.

Toxicological studies:

This helps to determine the pesticide residues, potentially toxic elements, safety studies in animals like LD50 and Microbial assay to establish the absence or presence of potentially harmful microorganisms.

Microbiological parameters: It includes the full content of viable, total mould count, total coliforms count. Limiters can be used as a quantitative tool or semiquantitative to determine and control the amount of impurities, such as reagents used in the extraction of various herbs, impurities ships directly from the manufacturing and solvents etc

CONVECTIONAL METHOD :This covers Identification and characterization of crude drug with Respect to phytochemical constituent. It employs Different analytical technique to detect and isolate the Active constituents. Phytochemical screening Techniques involve botanical identification, extraction With suitable solvents, purification, and Characterization of the active constituents of Pharmaceutical importance

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In spite of global reorganization and very sound history of traditional uses, promotion of herbal medicine faces number of challenges around the globe mainly in developed nations. Following problems need to be overcome before the promotion of traditional herbal knowledge around the world.

Quality issues: Adulteration, misidentification of plant, faulty collection and preparation, incorrect formulation process are the main problems that reduces the effectiveness of herbal preparation and can be considered as key factors affecting quality and purity of herbal medicines.

Processing and harvesting issues: Indiscriminate harvesting, poor agriculture and propagation method, poor pre and post harvest practices, lack of processing techniques leads to the substandard quality of herbal drugs.

Quality control related issues: Standardization, poor quality control procedure and lack of Good Manufacturing Practices (GMP) are the main hurdle to maintain the quality of herbal drugs. Lack of awareness regarding the guideline among growers and manufacturers, lack of implementation and regulation of the guideline are also frequent in small and medium scale industries.

Administrative issues: Lack of regulation and controlling authority in herbal sector, lack of proper monitoring and controlling are absolute need for the quality of drugs.

Infrastructure related issue: Lack of processing technique, trained personal, sophisticated instrument, utilization of modern techniques, facility to fabricate instrument locally are the major problems.

Pharmacogivilane: Proper pharmacogivilane in herbal sector is the need of time to find the toxicological data and adverse drug reaction of herbal drugs. Adverse reactions, contraindications, interactions with other drug, food and existing orthodox pharmaceuticals need to be monitor properly.

Clinical trial: Since the safety continues to be a foremost issue with the use of herbal remedies therefore, clinical trials are necessary to understand the safety and efficacy of these drugs before introduced them in global market.

IPR and biopiracy: Biopiracy is the major difficulty in promotion of herbal traditional medicine. Documentation of folk knowledge thus important for our future.

Irrational use: It is generally believed that herbal products don't have any side effects, interaction, but unfortunately is not true. Thus, irrational practice of these drugs can lead to various problems which can hinder the promotion of such drugs.

R&D: Research and development on dosage, processing, techniques are the key need for any drug, but in herbal sector it is quite less compare to allopathic medicine. Although in recent years, the trend is changing. Research to understand the mode of action and pharmacokinetics phenomenon, improvement/creation of monographs and reference standards for marker-based analysis are necessary of time. Decisive gap in current ethnopharmacological and modern medicinal plant research is another problem for sustainable, socio-culturally equitable and safe supply of herbal medicines.

Other issues: Unethical practice of herbal medicine, lack of qualified physician, exposure of unreliable and misleading information, lack of sufficient fund, absence of focused marketing and branding, lack of knowledge sharing also hold back the global promotion of herbal medicine. Lack of protection of biodiversity and protecting the traditional medicinal plants are also a big challenge.

Selection criteria for substances of herbal origin relevant for standardization and quality control of herbal medicines

General considerations in the standardization and quality control of herbal materials, herbal preparations and herbal medicines

Herbal materials, herbal preparations and finished herbal products are very complex. This can make the identification and quantification of herbal medicines very difficult and the detection of adulteration is very challenging. It should be emphasized that the identification of herbal medicines using markers, and quantification of marker substances in herbal medicines are not in themselves sufficient to guarantee the quality of herbal medicines. Quality control must cover all steps of their production and must be complemented by good agricultural and collection practices (GACP) and good manufacturing practices (GMP) (such as those described in references 1 and 4), as appropriate. Criteria for the selection of reference substances and quality control of herbal medicines should take into account that various ingredients may have different levels of influence on the final quality, safety and efficacy. For this reason, the order of selection of the substances for identification and quantification should follow the rules presented below. If constituents with known therapeutic activity (activities) have been identified, they should be used as markers.

If 1. Is not the case, but constituent(s) with recognized pharmacological activity (activities) is (are) known, they should be used as markers. If the above cases are not applicable, the identity and quantity of herbal materials, preparations and medicines may be established by the production process and by analysing marker substance(s) containing other characteristic constituent(s). Note that identification of herbal materials, and also to some extent herbal preparations and finished herbal products, may be done or may be complemented by microscopic, macroscopic or DNA analytical methods using appropriate reference materials and descriptions.

Drugs for advance technology

1.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.



2.SHANKPUSHPI (CONVOLVULUS PLURICAULIS)

Shankpushpi, clad by the vernacular names Shankhini, Kambumalini, Samkpushpi, Sadaphuli, and Sankhaphuli is a potent memory booster and brain tonic that actively works to improve intelligence and functioning of the brain. The name shankpushpi was given to the plant owing to its shankh or conch shaped flowers. It also helps in enhancing concentration, learning capabilities, mental fatigue, insomnia, stress, anxiety, depression, etc It improves mental health and might help in managing depression due to its antidepressant activity. According to Ayurveda, Shankpushpi helps to calm down the brain and relieve stress as well as anxiety. It also improves memory by acting as a brain tonic due to its Medhya (improves intelligence) property. You can take Shankpushpi powder along with warm milk or water to help boost memory and concentration. Shankpushpi tablets and capsules can also be used to improve brain functions. Shankpushpi Syrup is an ayurvedic remedy for memory and brainpower. It is beneficial in mental weakness, forgetfulness, memory loss, low retention power etc. However, medicines or supplements can only improve alertness, attention span, brain functions, nerve coordination and brain's retention capability, but these

supplements may not change your habits of procrastination. Therefore, daily brain exercises are also required to boost brain capabilities. capabilities. In Ayurveda, Shankpushpi has been given the status of a nerve tonic. The reason is that it contains elements such as tryptanoids, flavonol glycosides, anthocyanins, and steroids.



Conclusion:-

Plants, herbs, and ethnobotanicals have been used since the early days of humankind and are still used throughout the world for health promotion and treatment of disease. Plants and natural sources form the basis of today's modern medicine and contribute largely to the commercial drug preparations manufactured today. About 25% of drugs prescribed worldwide are derived from plants. Still, herbs, rather than drugs, are often used in health care. For some, herbal medicine is their preferred method of treatment. For others, herbs are used as adjunct therapy to conventional pharmaceuticals. However, in many developing societies, traditional medicine of which herbal medicine is a core part is the only system of health care available or affordable. Regardless of the reason, those using herbal medicines should be assured that the products they are buying are safe and contain what they are supposed to, whether this is a particular herb or a particular amount of a specific herbal component. Consumers should also be given science-based information on dosage, contraindications, and efficacy. To achieve this, global harmonization of legislation is needed to guide the responsible production and marketing of herbal medicines. If sufficient scientific evidence of benefit is available for an herb, then such legislation should allow for this to be

used appropriately to promote the use of that herb so that these benefits can be realized for the promotion of public health and the treatment of disease.

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