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Review Article

Recent Advances in Herbal Medicines – An Updated Review

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ABSTRACT

Nowadays peoples throughout the world have been attracting towards the herbal medicines. Worldwide favour the traditional healthcare system, so day-by-day uses of herbal remedies to cure diseases is increase instead of alternative medicines. Herbal drugs have an ability to maintain health and to treat various diseases therefore herbal drugs have been used since very earlier days. To fulfil the public requirement many companies have been using herbal drug technology for converting botanical materials into medicines, where standardization, quality control, modern scientific techniques and traditional knowledge are very necessary. This review focuses on recent trends in Herbal drugs and main motto is to explain the therapeutic effectiveness of various herbal drugs, adverse drug reactions, drug interactions, standardization and stability testing of herbal medicines, pharmacovigilance and regulatory status of herbal medicines.

Key words: Herbal drugs, Pharmacovigilance, Traditional healthcare system, Standardization, Drug interactions, Adverse drug reactions.

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INTRODUCTION:

According to the world health organization (WHO) guideline, herbal remedies are calculated as plant derived components with therapeutic effect and various human health benefits that contain main raw materials from one or more plants. For preparation of herbal medicine we have been using whole plants or parts of the plant like leaves, roots, seeds, bark, flowers, stems and extracts of all of these, therefore herbal medicine also known as botanical medicine or plant medicine or herbalism. Herbal drugs use to treat injuries, several

chronic diseases such as depression, asthma, cancer, anxiety, diabetes, tuberculosis, kidney diseases, arthritis, AIDS etc. It also deals with common cold, flu, allergy, jaundice, gall stone, menopause, impotence, cirrhosis, migraine, chronic fatigue, Alzheimer's disease, skin diseases, mental disorder, many other infectious diseases and herbal drugs give human health support, healing of wound or create a strong immune system. Because of such huge kinds of therapeutic activity, herbal remedies have been used since down of civilization. WHO issued a guideline for measurement of the safety, efficacy and quality control of herbal drugs ^[1,2]. WHO estimates that

only 10-20 % of the world populations currently does not use plant medicines that means approximately entire world presently use herbal drugs for major health care. Herbal drugs are easily available in nature sources and usually considered as safe and less cost, so herbal drugs are main component in traditional medicine and a common material in Ayurveda, naturopathic, homeopathic and other medicine systems. The use of herbal medicines is rapidly increase due to toxicity and side effects of allopathic medicines. Since a long time ago, herbal medicine have been more and more consumed by the people without any prescription. Botanical products have various beneficial activities like antimicrobial, anti-ageing, antidiabetic, anti-arthritis, antifertility, antianxiety, sedative, antispasmodic, antidepressants, anti-inflammatory, analgesic, vasodilatory, anti-HIV, hepatoprotective and memory enhancing activity [3-5]. World received the herbal drugs approximately 4000 years ago, from that period real world testing of herbal drug was started and herbal drugs survived thousands of years of human testing too. Due to toxicity, some herbal drugs have been prevented, though other drugs have been modified or combined with additional herbs because of side effects counterbalance.

ADVANTAGES OF HERBAL DRUGS:^[6,7]

1. Less risk of side effects
2. Minimum cost
3. Eco- friendly
4. More strength and effectiveness
5. Widespread accessibility
6. Promote tolerance
7. Excessive protection
8. Protection from chemical and physical degradation

DISADVANTAGES OF HERBAL DRUGS:^[6,7]

1. Limitation of herbal drugs

2. Not suitable for sudden illness and accidents
3. Lack of arrangement
4. Deficiency of proper dosage instruction
5. Trouble in standardisations
6. Herbal drugs take more time for treatment any disease
7. Wild herbs causes poisoning effect

USAGE AND PREPARATION HERBAL DRUGS:

The usefulness of herbal medicine is totally subjective to the patient. Herbal drugs produce safe and successful treatment for many diseases, if the use of herbal drugs maintain a right way. Various herbal drugs have various strength that completely depends on genetic distinction, growing conditions, timing and method of harvesting, uncovering of the herbs to air, sunlight and moisture and types of preservation of the herbs. Some of the plants that provide herbal drugs are cultivated and processed among the country and others are important from another around the world. Fresh ingredients for herbal drugs have been executed carefully from culture plants or accumulated from the wild. Herbal drugs are available in various forms and before use it require proper preparation^[8,9]. Usually herbal companies have been purchased dried plants or parts of the plants in bulk form and carefully packed for herbal teas and decoctions. In decoctions process, herbs are boiled in the particular volume of water for a certain time and straining out the formulation. Then cooled and filtered the formulation and collected the concentrated form of herbal drug. Most concentrated types of herbal drugs are obtainable in the form of hydro alcoholic tinctures and fluid extracts. The preparation methods of herbal drugs are different due to the character of the plants active chemical components^[10].

Table 1: Pharmacological Actions Of Herbal Drugs:^[11-13]

Pharmacological activity of herbal drugs	Examples
Antidiabetic Activity	<i>Acacia nilotica</i> , <i>Aegle marmelos</i> , <i>Aloe barbadensis</i> , <i>Arctiumlappa</i> , <i>Bombaxpentaridum</i> , <i>Cassia auriculata</i> , <i>Cinnamomumtamala</i> , <i>Catharanthusroseum</i> , <i>Dioscoreabulbifera</i> , <i>Eucalyptus globulus</i> , <i>Juniperuscommunis</i> , <i>Medicagosativa</i> , <i>Orthosiphonstamineus</i> , <i>Psidiumguajava</i> , <i>Salvia officinalis</i> , <i>Syzygiumcumini</i> , <i>Taraxacumofficinale</i> , <i>Urticadioica</i> , <i>Xanthium strumarium</i> , <i>Zea mays</i> , <i>Zingiberofficinale</i>
Anticancer Activity	<i>Acalypha fruticosa</i> , <i>Adiantumcapillus</i> , <i>Allium sativum</i> , <i>Aloe barbadensis</i> , <i>Embeliaribes</i> , <i>Ficusracemosa</i> , <i>Garcinia indica</i> , <i>Nigella sativa</i> , <i>Ocimumbasilicum</i> , <i>Plumbagozeylanica</i> , <i>Radix bupleuri</i> , <i>Scutellariabarbata</i> , <i>Terminalia chebula</i> , <i>Wrightiatinctoria</i> , <i>Vachellianilotica</i>
Anti-inflammatory Activity	<i>Achilleamillefolium</i> , <i>Bauhinia tarapotensis</i> , <i>Curcuma longa</i> , <i>Inulahelenium</i> , <i>Lonicera japonica</i> , <i>Rutagraveolens</i> , <i>Solanumnigrum</i> , <i>Vernoniacinerea</i>
Antidepressant Activity	<i>Bacopamonniara</i> , <i>Crocus sativus</i> , <i>Hypericumperforatum</i> , <i>Piper methysticum</i> , <i>Rhodiarosea</i> , <i>Tinosporacordifolia</i> , <i>Valerianaofficinalis</i>
Analgesic Activity	<i>Amaranthusviridis</i> , <i>Dalbergialanceolaria</i> , <i>Glauciumgrandiflorum</i> , <i>Hunteriaumbellata</i> , <i>Nepetaitalica</i> , <i>Sidaacuta</i> , <i>Zingiberzerumbet</i>
Anti-ageing Activity	<i>Arnica montana</i> , <i>Curcuma longa</i> , <i>Emblicaofficinalis</i> , <i>Lyciumbarbarum</i> , <i>Ocimum sanctum</i> , <i>Panax ginseng</i> , <i>Prunusamygdalus</i> , <i>Rosa damascene</i> , <i>Terminalia arjuna</i>
Dental care Activity	<i>Acacia arabica</i> , <i>Azadirachtaindica</i> , <i>Barleriaprionitis</i> , <i>Caryophyllusaromaticus</i> , <i>Mimusopselegi</i> , <i>Piper longum</i> , <i>Piper nigrum</i> , <i>Punicagranatum</i> , <i>Salvadorapersica</i> , <i>Stevia rebaudiana</i>

ADVERSE DRUG REACTION:

Some herbal drugs also shows adverse drug reaction. Few commonly used herbs that creates several adverse drug

reaction, are paprika causes headache; *Gingobiloba* causes spontaneous bleeding; ephedrine causes hypertension, cardiac arrhythmias, anxiety, insomnia, tremor,

seizure, myocardial infarction, nervousness, kidney stones; *Piper methysticum* (Kava) causes liver toxicity, torticollis, sedation, rash, intensity of Parkinson's disease, movements of the trunk, painful twisting; St. John's wort causes dry mouth, gastrointestinal disturbance, dizziness, allergic reaction, confusion, photosensitivity; chaste tree's fruit causes diarrhoea^[14,15].

HERBAL-DRUG INTERACTION:

When herbs or herbal drugs and allopathic drugs administered together may interact each other in body and leading to pharmacodynamics and pharmacokinetic changes. Drug with narrow therapeutic index (like digoxin, procainamide, warfarin, phenytoin, cyclosporine, theophylline etc.) may either have increased adverse effects or be less effective when used in combination with herbal drugs. *Allium sativum* (garlic) increased the clotting time and caused hypoglycaemia when taken with chlorpropamide. *Ginkgo biloba* (ginkgo) is used to treat Alzheimer's disease and caused high blood pressure when combined with warfarin or aspirin (acetylsalicylic acid) and even caused coma when combined with trazodone. *Piper methysticum* (Kava) has anti-anxiety property and causing synergism with benzodiazepines^[12,14,16]. *Panax ginseng* (ginseng) has multiple uses and shows synergism when taken with monoamine oxidase inhibitors and induced mania when combined with phenalgine, but ginseng improved the efficacy of influenza vaccination. St. John's wort is used to treat depression and causes reduced plasma levels of cyclosporine, warfarin, oral contraceptives, theophylline etc. kava increased the 'off' periods in Parkinson's patients when taken with levodopa and induced a semi-comatose state when combined with alprazolam. Kava prolong the hypnotic activity of alcohol in mice, but this incident was not observed in human^[2,10]. Now lead, copper, arsenic, silver, gold, mercury like heavy metals have been used for preparation of traditional herbal drugs that causes toxicity in patients. Interactions between herbal drugs and modern medicines may lead to life threatening consequence. The clinical importance of herbal-drug interactions depends on multiple factors including the nature of the particular herb, drug and patient^[11,13-15].

STABILITY TESTING OF HERBAL DRUGS:

Stable drug products hold down their identity, strength, therapeutic effect within given specifications throughout the shelf life. Stability testing is necessary because herbal medicines also contain chemical constituents like preservatives, flavouring agents etc., These chemicals are decayed that may lead lowering of concentration of drug in dosage form and as well as toxic product may form due to the degradation of chemical active ingredients^[17]. Environmental factors such as temperature, light, oxygen, moisture and size, shape of drug and excipients molecules, microbial contamination, trace metal contamination and container type may effect the quality and shelf life of the herbal drug product. Stability testing of herbal drugs is used to determine:

- I. The quality of the herbal drug substance
- II. Shelf-life for the herbal drug product
- III. Recommended storage conditions of herbal medicines

Therefore stability study is a very important parameter for manufacturing of herbal medicines. The stability study is performed under natural atmospheric conditions and also may performed under accelerated atmospheric conditions of temperature, humidity and light. With the help of modern analytical techniques like spectrophotometry, HPLC, HPTLC and by applying proper guidelines it is possible to determine the stability data of herbal drug product, by using this stability data, the shelf-life of this particular herbal drug product is predicted, which will help in global acceptability of herbal products^[18-25].

PHARMACOVIGILANCE OF HERBAL DRUGS:

According to WHO pharmacovigilance is the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug related problems. The main target of pharmacovigilance is to protect patients from undesirable and often unavoidable pharmacodynamics effects that occurs at therapeutic doses of previously identifying unrecognized hazard drugs, and it also explaining pre-dispersing factors and quantifying risk in relation to benefits^[22,2,14]. At present it's expand to include herbals, traditional and complementary medicines, blood products, biological, medical devices and vaccines. Since civilization herbal medicines are considered as harmless, but medicinal products they require drug observation due to recognize their risks. A survey claim that the risk is occurs due either to a contaminant or to an added drug. Continuous safety monitoring of herbal drug products is necessary because of very less knowledge about herbal drugs and their effects in human body, inadequate quality control and the heterogeneous nature of botanical drugs^[23,24]. WHO has strictly monitoring the safety of herbal drug products within the background of WHO programme for international drug monitoring (PIDM). Various types of herbal preparations are available but to analyse their causes of adverse events, the national pharmacovigilance centres will need special technical expertise^[25]. Currently many countries have a lack of this expertise and suitable analytic laboratories. Observation of pharmacovigilance includes impulsive reporting and stimulated reporting, effective surveillance, drug safety monitoring, registries. Comparative observational studies by survey study, case control study, drug-drug interactions and food-drug interactions. The information which published by pharmacovigilance is useful for educating doctors and official regulation of drug use. Therefore pharmacovigilance is a very important post-marketing parameter that assure the safety of pharmaceutical products and other health related products^[26].

REGULATORY STATUS OF HERBAL DRUGS:

Depend on country the lawful circumstances of herbal drugs are being changed. Developing countries have some folk knowledge about herbs and their use in traditional medicine. But these countries still do not include these traditionally used herbal medicines in drug legislation^[27,28]. Generally herbal drug therapy in most country is depend on traditional herbal references, provides they are not known to be unsafe when used to treat minor illnesses. But now many serious illnesses have been treating with herbal drugs where no traditional knowledge is present. On the other

hand plants contain hundreds of constituents and some of them are very toxic, so the idea the herbal drugs are safe and free from side effects is false. And most purchases herbal medicines are in conventional OTC environment. Therefore regulatory requirements of botanical medicines are essential to ensure the safety, efficacy and quality. To maintain the regulatory status of herbal drugs, it is important to perform clinical trial and toxicity of herbal medicine. The regulatory requirements of botanical drugs is varies from one country to other country^[29,30].

CONCLUSION:

WHO recognized that traditional, complementary or alternative herbal medicine has many advantages. Herbal medicines has been playing an important role in health care system all over the world not only in the diseased condition but also as a potential therapeutic aids for maintaining proper health. It is sure that the herbal industry can make a great strides in the world. With the increased use of herbal products, it's also necessary to focus on the future worldwide labelling practice for adequately address quality aspects. Standardization of methods and quality control data on safety and efficacy are required for understanding the exact use of botanical medicines. Even WHO considered *Artemisia annua* has an ability to treat novel coronavirus (nCoV). A major factor which hampering the development of herbal medicinal industries in many developing countries has a lack of knowledge about the social and economic benefits that could be derived from the industrial utilization of medicinal herbs. Further research is needful to utilize the herbal drug compounds responsible for the observed biological activity.

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