INTRODUCTION

History and Introduction to Herbals:

Medicinal plants had been in use since 5000 B.C. Oldest peoples known herbal is Pen-t’sao written by emperor Shen-Nung around 3000 B.C. It contains 365 drugs, one for each day of the year. Indians worked meticulously to examine and classify the herbs. Charaka made 50 groups of 10 herbs, each of which would suffice an ordinary physician's need. Similarly Sushruta arranged 760 herbs in 7 distinct sets based on to some of their common properties. Charaka says, “There is no substance in the world that has no medicinal value, provided you know how to use it”.

It is very surprising to know, that according to the literature, around 60,000-75,000 species of higher plants exist on earth and around 15,000 to 20,000 have been reported to have medicinal value but nearly 1500 plants have been currently used in various Ayurvedic preparations, where as only 750 to 840 have been evaluated for its therapeutic value in the form of extracts.

Herbal Drugs:

Man’s existence on this earth has been made possible only because of the vital role played by plant kingdom. Nature always stands as golden mark to amplify the outstanding phenomenon of symbiosis. Medicinal plants existing even before human being made their appearance on the earth.

Practically every country develops its own medical system, which includes the ancient civilization of China, Egypt and India. Thus, the Indian Medical System-Ayurveda came into existence. The raw materials for Ayurvedic medicines were mostly obtained from plant sources in the form of crude drugs such as dried herbal powders or their extracts or mixture of products. Also, Siddha, Unani and Tibetan are traditional health care systems have been flourishing for many centuries. Apart from these systems there has been a rich heritage of ethnobotanical usage of herbs by various colorful tribal communities in the country.

If we do well for a moment on our hoary past, Rigveda, one of our oldest repositories of human knowledge written between 4,500-1,500 B.C. mentions the use of 67 plants for the therapeutic purposes and Yajurveda enlists 81 plants whereas Atharvaveda written somewhere 1,200 B.C. describes 290 plants.

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India unquestionably occupies the top position in the use of herbal drugs. It is one of the foremost countries exporting plant drugs or their derivatives and excels in home consumption too. According to Indian mythology, when the illness and diseases got rampant on the earth, the sages learnt the science of healing from Lord Indra and recorded them in scriptures.\(^7\)

It has been estimated that about 75,000 species of higher plants exist on the earth. A reasonable estimate of about 10% has been used in traditional medicine. However, perhaps only about 1% of these are acknowledged through scientific studies to have therapeutic value when used in extract form by human.\(^3\)

Natural products have been derived from higher plants, microbes or animals and those can be of either terrestrial or marine or aquatic origin. The medicinal preparations based on these raw materials were in the form of crude drugs. With the advent of scientific methods, many of these reputed medicinal plants came under chemical investigation leading to the isolation of active principles. Beginning with 1,800 A.D., there was continuous activity in this area and many of the well known medicinal plants were chemically analyzed and their active principles characterized. Subsequently, such compounds became part of pharmacopoeias of several countries. This is where herbal medicine and modern medicine have a common link.\(^7\) Interest in medicinal plants as a re-emerging health aid has been fueled by the rising costs of prescription drugs in the maintenance of personal health and well-being, and the bioprospecting of new plant-derived drugs. Natural products have served as an important source of drugs since ancient times and about 67% of the today’s useful drugs are derived from natural sources. Search of chemical scaffolds for discovering new drugs is endless process. Recent technological progresses still enhance the significance of natural products in drug discovery arena because of their superiority over synthetic and combinatorial compounds in terms of numbers, diversity, design and biological relevance. It is now realized that these factors fundamentally decide the success rate in lead-finding process. Such a huge contribution has come from merely 10% of the world’s total biodiversity that has ever been explored. However the technological progress and acceptance of new models in drug discovery could not substantially add to the list of new drugs. Rather there was a decline in the average number of new chemical entities generated in year 2001 as compared to 1990-1994. A

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recent survey throws light on the fact that drug discovery had been dependant upon natural sources to very large extent. The proportion of drugs coming from natural resources is considerably high as in case of anti-platelet drugs (75%), anti-migraine (70%), anti-ulcer (47.6), and anti-inflammatory drugs (32.5%). Out of 244 prototype chemical structures that were explored, about 83% were from natural sources and only 17% were from pure synthetic origin or were result of chance observation of novel biological activity of the earlier known natural products. Unusual life forms such as parasitic plants are worthy in this connection. Parasitic angiosperms are unique life forms that are parasitic to other higher plants.

India is endowed with a rich wealth of medicinal plants. Herbs have always been principal forms of medicine in India and presently they are becoming popular throughout developing countries, as people strive to stay healthy in face of chronic stress and pollution and to treat illness with medicines that works in concert with body’s own defense.

Medicinal plants also play important role in lives of rural people, particularly in remote parts of developing countries like India with few health facilities. It is estimated that around 70,000 plant species, from lichens to towering trees have been used at one time or another for medicinal purposes. In Indian history, the uses of plants for therapeutic purposes have been mentioned in several books of Ayurveda. The other systems of medicine such as Homeopathy, Siddha, and Aromatherapy also use plants for therapeutic purposes. Now a day it is a proven fact that the herbs provide starting materials for isolation or synthesis of conventional drugs. Medicinal plants have curative properties due to presence of various complex chemical substances of different composition, which are found as secondary plant metabolites in one or more parts of these plants. Such plant metabolites according to their composition are grouped in various classes such as alkaloids, glycosides, tannins, etc. All these classes are medicinally important for example, alkaloids –such as morphine, codeine from opium poppy, strychnine and brucine from *Strychnus nuxvomica*, quinine from cinchona, emetine from ipecac, vasicine from vasaka all these are alkaloids plays important role in medicines. Glycosides such as digoxine from digitalis, strophanthin from stropanthus, and gycerrhizin from *Glycerrhiza glabra* all are medicinally important glycosides. Some of essential oils from plant origin also

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possess medicinally potent activity such as peppermint. Medicinal and aromatic plants are found in forest areas throughout South Asia, from plains to high Himalayas, with greatest concentration in tropical and subtropical belts and also in arid regions of Thar desert. India recognizes more than 2,500 plant species which have medicinal values, however large flora waiting for investigation for their medicinal properties.

**Indian Herbs:**

Now-a-days natural products are an integral part of human health care system, because there is popular concern over toxicity and resistance of modern drugs. India is one of the 12 leading biodiversity centers with presence of over 45,000 different plant species, 15000-18000 flowering plants, 23,000 fungi, 16,000 lichens, 18,000 bryophytes and 13 million marine organisms. From this flora, 15,000 to 20,000 have good medicinal value. Among those only about 7,000 plants are used in Ayurveda, 600 in Siddha, 700 in Unani and 30 in modern medicines.

**Pharmacognosy: Base of Phytopharmaceuticals**

Pharmacognosy, the term coined and used by Seydler in 1815 in his work entitled ‘Analacta Pharmacognostica’, which literally means “to acquire knowledge of drugs”. This term seems to be appropriate and as it is primarily concerned with the naturally occurring substances having medicinal activity. Pharmacognosy although closely related to botany and phytochemistry, many other fields do have a natural association with this subject such as pharmacology, analytical chemistry, microbiology, plant tissue culture biotechnology, and genetic engineering etc. Conventionally, it is an applied science concerned with the description, identification, cultivation, collection, preparation, storage and standardization emphasizes mainly the botanical and phytochemical side of the subject.

Views on the beginning of life on planet earth have forever remained controversial and unending subject of debate. Nevertheless, we can say with certainly that the plants were already there when man made his appearance on earth. As man begins to acquire closure acquaintance with his environment, he began to know more about plants, as these were the only curative agents he had. As he progressed and evolved, he was not only able to sort on as to which plant served for eating and which did not. All these states of affairs indications the origin of pharmacognosy in its totality is not work of just one or two continental areas but the overall outcome of the

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steadfast work of many of the bygone civilization like the Chinese, Egyptians, Indian, Persian, Babiloinean, Assyrian and many more.

Ayurvedic system of medicine, various natural drugs is incorporated in different preparations due to their great importance from the professional and economic point of view. Various drugs have stood the test of time and continue to heal ailments of mankind. Medicine is very ancient art and drugs been used in antiquity of far back as history can take us. The medicinal use of plants is also found in Rigveda, which is one of the oldest books. Today also a large part of population in India depends upon the system of medicine, Ayurveda, Siddha, Unani.

Plants for the medicinal purpose have been extensively used by man since time immemorial. The knowledge on the efficiency of certain plants for certain diseases has probably been based to great extent on empirical observation and has probably has been handed down from generation to generation. Drugs employed in the Ayurvedic system of medicine are mainly of plant in origin. Many of the herbal drugs reported to be effective in curing various diseases in the traditional system of medicine. Ayurvedic system of medicine prefer today also by medical practitioners than allopathic drugs to treat various types of diseases because Ayurvedic drugs have less side effects and less addiction properties. In preparations of Ayurvedic medicine whole plants or parts of plants are used as remedies. In India from ancient time Ayurvedic medicines are used. The common people accept Ayurvedic medicines are due to its low cost. Also in Ayurvedic system of medicines it does not come under drug price control and excise duty, no stringent rules for proving efficiency or for clinical trials are laid down. Nature always stands as a golden mark to exemplify the outstanding phenomena of symbiosis. In the Western World, as the people are becoming aware of the potency and side effect of synthetic drugs, there is an increasing interest in the natural product remedies with a basic approach towards the nature. Natural products from plant, animal and minerals have been the basis of the treatment of human disease. Today estimate that about 80% of people in developing countries still relays on traditional medicine based largely on species of plants and animals for their primary health care. Alternative medicine is the needs of the day.

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Herbal medicines are currently in demand and their popularity is increasing day by day. In the healthcare sector, WHO recommends and encourages the use of traditional herbs/remedies because huge amount of raw material is easily available. They are comparatively safe because of their low toxicities. Till today most of the villagers relays on herbal remedies as these have psychological effect on the common man in mind that it will spared of the side effect of allopathic drugs and will magically cured. However, plants are very complex in their composition and their therapeutic activity depends on their chemical constituents, these according to age, geographical location and harvesting processes. Also improper authentication of herbs, adulterations by microorganism, pesticide residue, has made standardization of herbal drug of primary importance.

Plant based drugs have been used worldwide in traditional medicines for the treatment of various diseases. According to a survey by NCI, USA, 61% of the 877 small molecule new chemical entities introduced as drugs, worldwide during 1981-2002 were inspired by natural products. Plant species still serves as a rich source of many novel biologically active compounds, as very few plant species have been thoroughly investigated for their medicinal properties. Thus, there is renewed interest in phytomedicine during last decade and now a day’s many medicinal plant species are being screened for pharmacological activities.

The research on the medicinal plants should be extended with the identification of the active principles in the plants. Scientific examination of the remedies could lead to standardization and quality control of the products to ensure their safety. It is after such evaluations that they can be approved for use in the primary health care. Such research activities could also lead to the development of new drugs as in the past.

As a result of rapid development of phytochemistry and pharmacological testing methods in recent years, new plant drugs are finding their way into medicine as purified phytochemical. Pharmacognosy is the infrastructure on which depends evolution of novel medicine, as it is a source of therapeutically significant substance that cannot be synthesized economically. Further, the crude drugs also provide essential intermediates for final synthesis of active compounds.

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Prospects of Pharmacognosy: \textsuperscript{9}

There is a worldwide ‘green’ revolution, which is reflected in the belief that herbal remedies are safer and less damaging to human body, furthermore, underlying this upsurge of interest in plants is the fact that many important drugs in use today were derived from plants or from starting molecules of plant origin. Hence, plants seem to have served as models in drug development.

Herbal Drug Market: \textsuperscript{8}

The global herbal products market is worth of US $32 billion and is growing at a rate of about 9-15%. The average turnover of Indian herbal medicine industry is about 2,300 crore rupees. However, to achieve the goal of major exporter of herbal remedies, several steps need to be taken.

- Systematic study of world market demand and short-listing of medicinal herbs with good potential.
- Systematic cultivation of medicinal herbs on a large scale.
- Encouragement for agro-based phytochemical and pharmaceutical industries to manufacture value added herbal products.
- Strict legislation to control quality and purity.
- Upgradation of cultivation and collection process.
- Documentation of research work and standardization for quality.

Herbal Drugs promotion : \textsuperscript{10}

Phytochemistry or natural product chemistry research is the backbone of herbal industry. For promoting use of herbals in modern medicine, phytochemistry should be envisaged for:

- Isolation, purification and characterization of new phytoconstituents.
- Use of newly isolated phytoconstituents as “lead” compound for the synthetic design of analogues with either improved therapeutic activity or reduced toxicity.
- Conservation of lead phytoconstituents into medicinally important drugs.

Ethnopharmacological Approach to Herbal Drugs : \textsuperscript{10}

The term ethno-pharmacology refers the interdisciplinary scientific observation, description and experimental investigation of indigenous drugs and biological activities. There are 119 drugs of known structure that are still extracted from higher plants and used globally in allopathic medicine.
Practical Aspects of Herbal Drug Discovery: 10

The following scheme represents a summary of the stages involved in the development of pure drug from a plant source.

- Collection and identification of the plant and deposition of voucher sample in herbaria.
- Literature survey on the plant species selected for studies.
- Extraction with solvent and preparation of non-polar and polar extracts for initial biological testing.
- Evaluation of plant extract against a panel of biological test methods, as exemplified by receptor binding, enzyme inhibition and/or cytotoxicity assays.
- Activity guided fractionation on the extract showing activity, by monitoring each chromatographic fraction with bioassay chosen from the panel available to the investigation.
- Structure elucidation of pure active isolate(s) using spectroscopic techniques and chemical methods, if necessary.
- Test each active compound (whether of novel or known chemical structure) in all in vitro and in vivo biological test methods available, in order to determine potency and selectivity of the drug.
- Molecular modeling studies and preparation of derivatives of active compound.
- Large-scale isolation of interesting active compounds for toxicological, pharmacological and for mutation studies, when total synthesis is not practical.
- Clinical trials (Phase I – III).
REFERENCES


