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Indigenous drugs can form an indispensable part of health care in view of the limitations of modern medicine and economic constraints for a developing country. In a vast developing country like India, the cost of modern medicine remains prohibitive and out of reach of many. Ethnomedico-botany focuses on the knowledge of medicinal plants that people have developed over generations. The World Health Organization estimates that as many as 80% of the world's population depend on plants for their primary health care¹. Over 40% of medicines now prescribed in the U.S. contain chemicals derived from plants. Inspite of the tremendous progress in the development of modern medicine, plants continue to be an important source of drugs throughout the world, particularly in the developing countries.

India is one of the world's 12 regions having the largest biodiversity². It has 45,000 plant species of which 15,000–20,000 possess proven medicinal value. Medicinal plants and herbs contain substances known to modern and ancient civilizations for their healing properties. Until the development of Chemistry and, particularly, of the synthesis of organic compounds in the 19th Century, medicinal plants and herbs were the sole source of active principles capable of curing man's ailments. They continue to be important to people who do not have access to modern medicines. Moreover, modern pharmaceuticals rely heavily on the same active principles, be they natural or synthetic. The active principles differ from plant to plant due to their biodiversity.
Historically, plant medicines were discovered by trial and error. Our ancestors noticed that aches and pains went away when they drank tea made from the bark of a willow tree. Later, scientists found that willow bark contains salicylic acid, the active ingredient in aspirin.

The work of isolation of active principles from medicinal plants and characterization, can be traced to the beginning of 19th century. From crude drug “Mahung” (*Ephedra* *spp.*) of China ephedrine (1) was isolated in 1887 and later introduced as a drug in 1925. Likewise, from opium (*Papaver somniferum*) morphine (2) was isolated in 1804 and introduced as a drug in 1818. From Cinchona *Spp.* of Peru, quinine (3) was isolated in 1820 and introduced as drug in 1825. “Ipecacaunha” (*Cephaelis ipecacuanha*) of Brazil emetine (4) was isolated in 1894 and introduced as drug in 1947.
Large number of drugs from medicinal plants were discovered and introduced in modern pharmacopoeias during 1850-1950. Some of the important crude plant drugs are belladonna (*Atropa belladonna*), cascara (*Rhamnus purshina*), digitalis (*Digitalis purpurea*), rouwolfia (*Raufia sepentina*) and veratrum (*Veratrum viride*). A number of laboratories throughout the world are currently investigating plants used in traditional medicine for their active constituents. In the 1950's the "periwinkle" (*Vinca*
*rosea* yielded some alkaloids, vinblastine (5), vincristine (6) and vincamine (7) particularly useful in the treatment of leukaemia\(^5\). Great piles of crushed periwinkle leaves are now exported from India to the U.S. to be ground and processed into anti-cancer drugs:

(5) \( R = \text{CH}_3 \)

(6) \( R = \text{CHO} \)

(7)
Folk medicine describes a drug "Ati-bala" [confirmed as *Sida rhombodifolia*] to be the most powerful immunomodulator and modern investigations prove that the drug, stimulates phagocytosis, acts as anticomplementary agent, immune stimulant and hypoglycemic. According to the latest development the drug has been found to be effective in enhancing immunity in AIDS patients\(^6\).

In general, natural products that have come into modern medicine are the result of an approach to drug development adopted over the past fifty years or more. The goal has been to find new chemical structures that have a novel biological activity. The alternative approach of finding plant derived therapeutic agents as extracts that could be standardized and formulated, has not received attention. Production of standardized plant fraction should have priority over that of pure active substance, because of the simple technology needed and hence lower cost of the product. It would be advisable to find out the chemical composition of the composite fraction and pharmacological action of each constituent to ensure that are safe and compatible with each other.

It is a proven fact that a large percentage of herbal products sold in the market do not contain the content of active principles as claimed on the label. Manufacturers knowingly or unknowingly adding either substandard or inadequate herbal ingredient to the finished product or completely omitting the herb from the recipe due to high costs or unavailability in the market. Herbal standardization is now a much studied field and there exists complete know-
how on the standardization of single plant species as well as polyherbal products.

On the contrary, a herb or crude drug as used in a traditional system of medicine is a complex pot-pourri of compounds, some beneficial, some harmful, some vitamins and some even toxic—but all integrated under a certain (natural) rule to make a crude, function in the same way as a single chemical agent. This crude drug, thus acts as a single chemical agent without any or much side effects unlike synthetic or chemically isolated single compound from the plants.

Plants contain hundreds of different constituent chemicals that interact in complex ways. Frequently we simply do not know in detail how a particular herb works even though its medicinal benefit is well established. Biological activity is the result of chemical compound’s interaction with biological entity. In clinical study, biological entity is represented by human organism. In preclinical testing it is the experimental animals (in-vivo) and experimental models (in-vitro). Biological activity depends on peculiarities of compound (structure and physico-chemical properties), biological entity (species, sex, age, etc.), mode of treatment (dose, route, etc.). Animal efficacy studies are required when adequate and well-controlled efficacy studies in humans cannot be ethically conducted, as they would involve administration of potentially dangerous herb preparation or extract or dose of such herbs to healthy human volunteers, hence animals can be used as surrogates for humans. Fairly reliable animal models for a number of diseases have been
designed to study the effect of herbal drugs in living systems that are closely related to the system in humans.

The albino rat has come to be the most widely used laboratory animal. This extensive use is due to a number of factors such as low cost, small space requirement, tractability, omnivorous dietary, short time span of generations, large litters and the fact that the rat can be readily standardized.

The maintenance of the water and electrolyte balance of an organism is of prime importance for its physiologic well-being. Shifting of the water balance occurs in many diseases. Because pharmacologic agents are capable of evoking a favorable shift in water and electrolyte balance when it is altered in some diseases, drugs of this class are of great clinical importance.

Diuretics form a class of drugs which increase the volume of urine produced by the kidneys. They can be used effectively to treat mild cases of edema when kidney function is good and when the underlying abnormality of cardiac function, capillary pressure, or salt retention is being corrected simultaneously.

Urine contains many different mineral ions, some of which precipitate as solids at low concentrations. The predominant stone substances in the developed countries are calcium oxalate and calcium phosphate. Normal urine contains macromolecules which interfere with crystal growth, thus preventing stones from growing to a size where they are not naturally expelled in the urine stream. It is when stones become large enough to obstruct the
urinary tract that they can cause trouble. Whether or not stone disease needs surgical treatment depends on the nature of the obstruction rather than the size of the stone. The aim of non-surgical treatment is to get the patient to pass the stone spontaneously. This can be encouraged by a high fluid intake, sometimes coupled with brief diuretic treatment.

Although a good deal of information can be obtained from animal studies, it cannot be directly applied to man. Ethacrynic acid, a potent diuretic in man, has no diuretic or saluretic action in rats. Further there is no appropriate animal model comparable to the edematous state in patients. Hence, every new diuretic drug has to undergo experimental evaluation in man. Such studies are usually carried out both in normal human subjects and in edematous patients.

A number of drugs capable of producing diuresis in various clinical conditions associated with edema have been available for many years. Still the need for more effective and less toxic remedies is evident. Quite a good number of indigenous drugs have been claimed to have a diuretic effect in the Ayurvedic system of medicine and some of them are used even today by Ayurvedic physicians. Several indigenous drugs have already been screened by various workers for their diuretic activity. In herbal therapeutics, cardiac edema is specifically treated with *Taraxacum officinale* (Dandelion Leaf), which has a diuretic strength equivalent to furosemide but contains high enough concentrations of potassium to make supplementation unnecessary.
Of the vast number of medicinal plants used in India, a small number have received considerable attention as herbal diuretics. What follows is an overview of five medicinal plants of current interest viz. *Dichrostachys cinerea*, *Hemidesmus indicus*, *Parmelia perlata*, *Sida acuta* and *Sida cordata* focusing on their pharmacognostical studies, inhibitory effect on calcium oxalate crystal growth, diuretic activity and phytochemical studies.
The main objectives of the present investigation are:

1. To provide information about the distribution and vernacular names of some medicinal plants used as diuretics and for urolithiasis; to analyse the macroscopic and microscopic characters of the leaf, stem and root and also to standardize three plant drugs used as diuretics, performing a systematic pharmacognostical studies.

2. To grow calcium oxalate crystals \textit{in-vitro} in silica gel media in Hane's tubes by single diffusion method and to study the inhibitory effects of methanolic and aqueous extracts of the five medicinal plants on calcium oxalate crystal growth \textit{in-vitro}.

3. To characterize the grown crystals by optical microscopy, FT-IR, SEM and by measuring the lengths of crystal columns.

4. To evaluate the diuretic action of methanolic extract of three plants on male albino rats using Lipschitz \textit{et al.}, method.

5. To determine the effect of the drugs on Na$^+$, K$^+$ and Cl$^-$ content of the urine of albino rats.

6. To perform the preliminary phyto chemical analysis; thin layer and paper chromatographic studies and also to estimate quantitatively sugars, total free amino acids, L-proline and flavonoids in the medicinally important parts of \textit{Dichrostachys cinerea}, \textit{Hemidesmus indicus}, \textit{Parmelia perlata}, \textit{Sida acuta} and \textit{Sida cordata}. 
REFERENCES


