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Phytomedicine: An emerging opportunity of research and development in Vindhyan Eco-region, India

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Abstract

A detailed and systematic study for identification, cataloguing and documentation of plants, which may provide a meaningful way for the promotion of the traditional knowledge of the herbal medicinal plants. In addition to the proper utilization of technological advances, a logical interpretation of the modified language of traditional medicine also becomes a necessity in order to further promote research in this field. There is a paucity of information on medicinal plants and their pharmacological molecules of Vidhyan region. The pharmaceutical industry can extract the active ingredients before being used in the manufacturing of drugs hence; there is possibility of discovering new functional molecule through pre-identified medicinal plants of Vindhyan region for the evolution of novel drugs.

Keywords: ethno-botany, phytomedicine, vindhyan eco region, herbal plants

Introduction

Medicinal plants have always been the principle source of medicine in India since ancient past and presently they are becoming popular throughout the developed countries. Obviously, these plants help in alleviating human suffering. Medicinal plants would be the best source to obtain a variety of newer herbal drugs. For centuries plants have provided mankind with useful, sometimes life-saving drugs. Modern pharmaceutical in cases where correlation between chemical structure and biological activities were noted, empirical science began to give way to rational drug design. This emerging approach to identify and develop potential new drug is largely successful, due to the intellectual cooperation of medicinal chemistry. Therefore such plants should be investigated to better understand their properties, safety and efficacy. Plants have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions, and to defend against attack from predators such as insects, fungi and herbivorous mammals. At least 12,000 such compounds have been isolated so far; a number estimated to be less than 10% of the total. Chemical compounds in plants mediate their effects on the human body through processes identical to those already well understood for the chemical compounds in conventional drugs; thus herbal medicines do not differ greatly from conventional drugs in terms of how they work. This enables herbal medicines to be as effective as conventional medicines, but also gives them the same potential to cause harmful side effects^[1, 2]. The various parts of the medicinal plants used for various treatments include the leaves, barks, tubers, roots, herbs and the plant extracts. These parts secrete various substances like alkaloids, terpenes, phenolic compounds, basic metabolites, glycosides as well as secondary metabolites. Various preparations formed with medicinal plants include decoction, emulsion, apozems, liniments, electro-actives and powdered.

Ethno-botanical ground of medicinal values of plants: The ethnic and rural people of India have preserved a large bulk of traditional knowledge of medicinal uses of plants growing around them. This knowledge is handed down to generations through word of mouth and is extensively used for the treatment of common diseases and conditions. The indigenous method of preparation maintains the purity of the drug. Furthermore, traditional folk healers treat with kindness, grace, patience and tolerance, which play a vital role in healing process today. In every ethnic group there exists a traditional health care system, which is culturally patterned. In rural communities health care seems to be the first and foremost line of defense. The WHO has already recognized the contribution of traditional health care in tribal communities^[3].

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The age-old tribal knowledge of plants is an important aspect of ethno-botanical research. Tribal people are having great importance for their treasured and unique knowledge of plant's uses and wealth which is essential source for continuous research of new herbal drugs and other aspects of plants. The tribal tact's are the store house of information and knowledge on the multiple uses of plants. Presently Ethnobotany has become increasingly valuable in the development of healthcare and conservation programs in different parts of the world [4, 6]. The use of plants as medicines predates written human history. Ethnobotany is recognized as an effective way to discover future medicines [7].

Madhya Pradesh and Vindhyan region towards medicinal values of plants:

Madhya Pradesh sustains a very rich traditional medicinal plant wealth and inherits unique plant and animal communities. Vindhyan region is very rich in plant biodiversity because of its variety of geology, land shapes like plateau, plane, valley and hill areas. There are varieties of climate and altitudinal variations compiled with varied ecological habitats. There are rivers like Son, Narmada, Tons and hill ranges like Vidhyan, Maikal and Satpura lies in this area. These features make the area unique in their natural resource and medicinal value of plants [8].

IPR privileges: Indigenous knowledge on natural resources, utilization of medicinal plants not exceeding the resilience of the surrounding environment is regarded as an important measure of sustainable plants biodiversity conservation. Without proper documentation of such knowledge, the cultural heritage is losing its identity and also the exploitation, by violating patent laws & GI laws, communities and the countries who invented the material does not get awarded.

Elements in Medicinal value: Specific parts of several plants (fruits, leaves, stem, bark and roots) often used as medicines in the Indian Ayurvedic system have been analyzed by Singh and Garg [9] for 20 elements (As, Ba, Br, Ca, Cl, Co, Cr, Cu, Fe, K, Mn, Mo, Na, P, Rb, Sb, Sc, Se, Sr and Zn) by employing INAA. Similarly, elemental analysis of some herbal plants used in the control of diabetes has been done by the techniques of Neutron Activation Analysis (NAA) and Atomic Absorption Spectroscopy (AAS). The elements Mn, Na, Cl, Al, Cu, Pb, Ni, Cr, Cd, Fe, Ca, Zn and Hg were found to be present in different plants in various proportions [10, 11]. In 1982, Dr. Satyavati had expressed need for well-planned clinical studies. 32 years later, the status has not changed.

Research, development and pharmaceutical industry: In 2001, researchers identified 122 compounds used in modern medicine which were derived from "ethnomedical" plant sources; 80% of these have had an ethnomedical use identical or related to the current use of the active elements of the plant [12]. Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies, including aspirin, digitalis, quinine, and opium. The use of herbs to treat disease is almost universal among non-industrialized societies, and is often more affordable than purchasing expensive modern pharmaceuticals. Studies in the United States and Europe have shown that their use is less common in clinical settings, but has become increasingly more in recent years as scientific evidence about the effectiveness of herbal medicine has become more widely

available. In many medicinal and aromatic plants significant variations of plants characteristics have been ascertained with varying soil traits, and the selective recovery and subsequent release in food of certain elements have been demonstrated. Great attention must be paid to choose soil and cropping strategies, to obtain satisfactory yields of high quality and best-priced products, respecting their safety and nutritional value [13]. It also facilitates pharmacology studies leading to synthesis of a more potent drug with reduced toxicity. Presently in the developing countries, synthetic drugs are not only expensive and inadequate for the treatment of diseases but are also often with adulterations and side effects. There is therefore the need to search for plants of medicinal value [14]. In recent times, focus on plant research has increased all over the world and a large body of evidence has collected to show immense potential of medicinal plants used in various traditional systems. More than 13,000 plants have been studied from last 5 to 10 year period. There is a growing interest in correlating phytochemical constituents of a plant with its pharmacological activity [15, 16]. With the advances in cellular biology, a shift towards studying changes in cytosolic enzyme activities, DNA patterns and genetic control has been observed rather than concentrating merely on the gross effects induced by the plant drugs. The work done on rasayana group of plants is a good example of the above statement [17]. Very few articles published in the last 5 to 10 years have provided adequate information on the procedures adapted by the researchers for quality assurance of the plant products. Any publication related to phytopharmacology should ideally provide data on the authentication and standardization of the plant products.

Protocols can be used to extraction of phyto-chemicals

Collection of Plant Material: Fresh plant leaves; bark and roots were also collected from the plant to be studied from different patches of Vindhyan valley.

Extraction: Slandered method reported in published article

A-Quantitative Analysis

- Humidity
- Dry residue
- Extractable material, Ashes
- Physical parameters (density, rotational capacity, refractory index)
- Chemical indices (acidity, saponification, especially for essential oils)
- Pollutants, Heavy metals, pesticides, aflatoxins.
- Reaction identification, Colors, precipitation, fluorescence, micro-sublimation, etc. which enable us to detect certain characteristic constituents in plants flavanoids.

B. Qualitative Analysis

- Phyto-chemical screening
- Carbohydrates
- Tannins
- Saponins
- Flavonoids
- Alkaloids
- Anthocyanin and Betacyanin
- Quinones
- Glycosides
- Cardiac glycosides
- Terpenoids
- Triterpenoids

- Phenols
- Steroids
- Coumarins
- Acids

Heavy metals: Mn, Na, Cl, Al, Cu, Pb, Ni, Cr, Cd, Fe, Ca, Zn and

Chromatographic methods (HPLC & TLC): These Technique can be used to separate the different phyto-chemicals and unknown pharmacological compounds.

Spectroscopic methods: This technique can be used to identify heavy metals in mixture.

Some significant contribution have been made by a few scientist & researchers for the development of Vindhyan Eco Region through their research and development in perspective with its Ethno-botanical importance are mentioned below with their references.

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Conclusion

High time has arrived to look at our old literatures on

traditional medicine & make new grounds for Research on them. These researches may give us active phyto-chemicals; reported extracted molecule of vital pharmacological value; which can be used to overcome fatal diseases and provide drugs in cheaper rate for human welfare. Research outcomes may also be used to produce safe ayurvedic medicine by the Indian pharma industry with government laboratory accreditation and support as already been seen in recent time for diabetes care & other metabolic diseases. Research outcome generates a large panel of pharmaco-compounds of plant and more research is needed to screen out that only compound of best medicinal uses instead of whole plant consumption that may increase the toxicity load of unwanted compound in human body. Moreover the data of research can be utilized to extend the knowledge of medicinal plant of Vindhyan region and their compound for its pharmacological value. Data exploration from previous studies would generate the path for new drug discovery and give new way to scientific community to do research in medicinal plants of Vidhyan valley which is adequate in natural recourses. When Research outcomes were commercially adapted by Pharma industry which helps in generating local employment and increases revenue ultimately leads to the economic growth of state as well as country. In future, more coordinated multi-dimensional research aimed at correlating botanical and phyto-chemical properties to specific parts of Vindhyan region is expected. In terms of pharmacological activity, more attention has been paid to CNS-active, cytoprotective, immune-modulators and chemotherapeutic plant products. Nutraceuticals will open up an entirely new field for exploration and, in the near future, dietary modulation of diseases may emerge as an alternative mode of therapy. Genetic profiling and germplasm conservation can be done for valuable wild plant species. On this note, we are speculating for the better future of the Vindhyan Eco Region. The measures which could be adopted for its betterment through R & D require state of art technology; hence we need the involvement of government and Private companies respectively for improving the wholesome condition by attracting investment in this regard.

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