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THE INTERCONNECTION BETWEEN TRADITIONAL MEDICINE AND PHARMACOGNOSY CONTENT EXPLORING THE SIMILARITIES AND DIFFERENCES BETWEEN THE TWO DISCIPLINES THROUGH PLANT BASED HEALING PRACTICES

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Annotation: This article highlights the global significance of traditional plant-based medicines, emphasizing their longstanding use in various cultural and medicinal systems such as AYUSH, Traditional Chinese Medicine (TCM), and Islamic medicine. It explores how traditional healers have historically used various plant parts in different formulations to treat illnesses and how this knowledge has been passed down through generations. Despite the existence of around 30,000 medicinal plants used globally, only a small percentage have been scientifically studied for their bioactivity. The article explains the process of drug development from plant sources, including extraction, isolation, characterization, and structural elucidation of bioactive compounds. It underscores the integration of modern analytical techniques like NMR, mass spectrometry, chromatography, and bioassays with ethnobotanical knowledge to validate and standardize traditional remedies. The collaboration between botanists, ethnobotanists, pharmacologists, chemists, and biotechnologists is considered essential for developing safe and effective plant-derived drugs. The article concludes that although drug development from plants is time-consuming and costly, it remains a reliable and authentic approach to discovering new medicines based on centuries-old traditional knowledge.

Key Words: Traditional Medicine, Medicinal Plants, Plant-based Drugs, Ethnobotany, Phytochemicals, Bioactive Compounds, Drug Discovery, Herbal Medicine, Pharmacognosy, Botanical Identification, Extraction Techniques, Structural Elucidation, NMR and Mass Spectrometry, Bioassays, Pharmacological Activity, AYUSH, Traditional Chinese Medicine, Indigenous Knowledge, Herbal Pharmacology, Natural Product Chemistry

Globally the use of plants for food and medicines have been mentioned and documented from ancient times. As per WHO approximately 80% of people utilizes plant in the form of medicines either in traditional practices or in the form of modern plant based medicines [1]. The plant based traditional medicines are very commonly used in Asian and African countries as compared to that in western world, however few records of traditional plant based medicines are found in Native American tribes [2]. The practices of AYUSH in India, TCM (Traditional Chinese medicine) in China, traditional Islamic and Arabic medicines in Arab countries and Central Asia, KAMPO medicines in Japan very commonly utilizes plants for the treatment of various ailments [3].World Herbal Encyclopedia published by Patanjali Research Foundation in India documents the use of plants by 2000 tribes of world highlighting their traditional medicinal uses, chemical composition, pharmacological evidences, and other valuable information including their vernacular names [4]. In Flora of Uzbekistan more than 1200 medicinal plants have been reported, however about 600 of them are used in traditional medicines and only 200 species have been investigated for their phytochemicals [5].

Since ancient times the traditional healers in a community utilizes various parts of plants in the form of powder, decoctions, ointments, lotions, dried infusion, tinctures, concoctions for

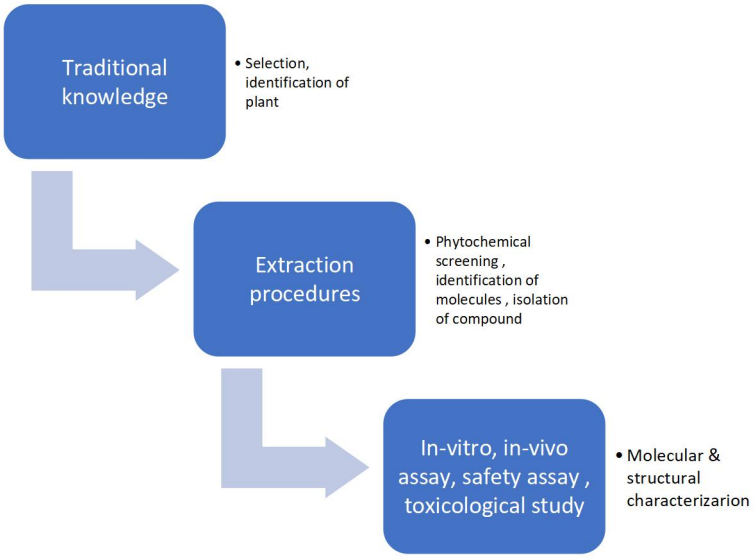
management of various disease [6]. The use of plants was based on their wisdom and methods of their own native society [7] and passed through generations, keeping it secret in their own family [8]. The traditional healers were well aware about the identification of plant as well as the specific use of medicinal plant. Some plants were used both for edible as well as medicinal purpose as Allium cepa L., Allium sativum L., Beta vulgaris L.,Chenopodium album L.,Carum carvi L.,Brassica rapa L.,Cucumis sativus L.,Cucurbita pepo L. , and many more. Globally approximately 30,000 plants species are used traditionally for medicinal practices [9] and only 16% of them have been evaluated for their biological activity [7].Understanding the mode of action of these natural herbs is a complex process because usually the mixture of materials or partitioned fractions are used medicinally and more or less synergistic mechanism plays an important role during treatment from herbal medicine[10].Therefore the recent researches are focused on development of analytical methods for isolation procedures, characterization and identification of new compounds, their elucidation of structures , chemical reactivity , mechanism of action , safety of consuming them as medicines[11].

It was in 1785 that the medicinal use of Digitalis purpurea (Foxglove) was used to prepare cardiac drug containing digioxin as principle biomolecule. Similarly, Salix alba (willow plant) was used traditionally by healers for fevers and pain, and later on identified with potent biomolecule salicyclates leading to discovery of aspirin [12]. Other few medicines developed from plant based molecules includes quinine (Cinchona officinalis L.) [13], reserpine (Rauvolfia serpentina (L.) Benth.ex Kurz [14], atropine (Atropa belladonna L.)[15], morphine, (Papaver somniferum L.)[16] and many more. However, with the advent of science in more structured manner the proper identification and authentication of the natural source both plants and animals for using as medicine became of prime importance. The documentation of traditional knowledge is also one of the important step and is considered as the first and foremost important step in pharmacognosy[17].

The plants provide biomolecules with therapeutic potential which serves as source for development of new drug development ideas [18]. The preparation of drug from natural source require a thorough study of plant to extract and isolate the bioactive molecule from it. The elucidation of its comprehensive structure and properties, mode of action including its potential therapeutic effects and medicinal properties of the active compound are essential part of drug development [19,20]. The botanist and ethnobotanist plays an important role in identifying and collecting the authentic plant sample from the fields. It is considered to be an important phase [21]. The procedure for extraction of active biomolecule from plants depends on the nature of material i.e., plant and the chemical composition of the active molecule. [22]. However, some commonly used methods includes Soxhlet extraction, supercritical extraction, pressurized hot water extraction etc. As the extracted material can contain other metabolites also thus to separate the bioactive and other material procedures like HPLC, column chromatography, solvent partitioning etc are used for the segregation. Thereafter the in-vitro and in-vivo bioassays are used for the evaluation of the efficacy, safety, and probable mechanism of action of these drugs. The establishment of chemical structure is also a critical step which utilizes NMR and mass spectroscopy which establishes the comprehensive insight of functional groups and spatial arrangements of atoms in the molecules. All these steps are usually nowadays combined with various computational modelling, synthetic chemistry initiatives, chemical informatics research as well as unique screening approaches in pharmaceutical laboratories along with biotechnology laboratories [23-25].In several studies the isolated bioactive molecules from various plants have been studied for their pharmacological efficacy including antioxidant activity , immunomodulatory functions , hepatoprotective activity, antiproliferative

activity etc. Overall the development of plant based drug involves the active participation of botanist, plant ecologist along with the researchers in the field of pharmacognosy, medicinal and organic chemistry, molecular biology, microbiology, biochemistry [26,27]. The current need in development of drug from plants require a unique collaboration between the researchers /students of various departments (Figure).

Based on the traditional medicinal information, the suitable plant material can be collected, identified through authentic source by a botanist. Thereby various extraction procedures along with other specific methods can be performed to get the desired drug. However sometimes this method of drug development seems to be too length and costly also but provides a validated and authentic means to develop plant based drug based on traditional medicinal information of a nation used since ancient times. The traditional healing method by the use of plants utilizes the information passed through generations in a community and today this information is synchronized with the use of modern instrumental techniques to obtain a unique phytochemical responsible for a targeted reaction against a disease.



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