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Ethnopharmacology and Traditional Uses of Medicinal Plants: Bridging Gaps between traditional Knowledge and Modern Science

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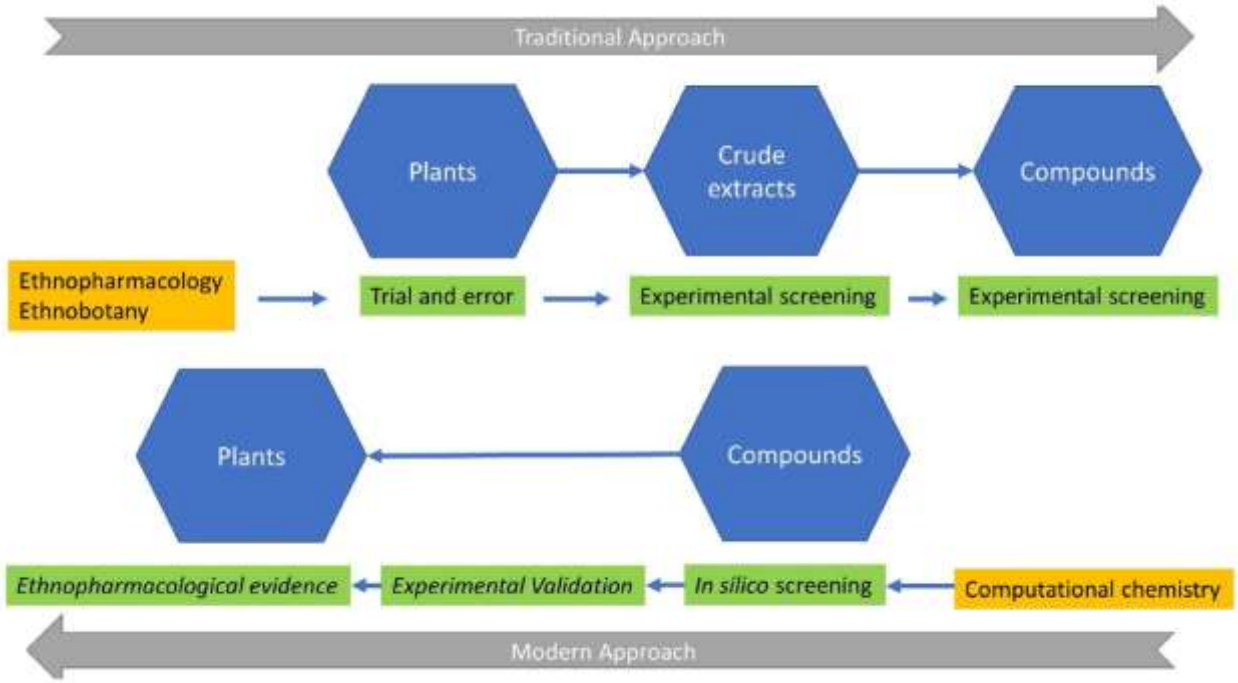
ABSTRACT:

An early basis for the medicinal use of natural chemicals was supplied by ethnopharmacology through its explanation of the health benefits of plants. Natural products have long been used by various people and investigated as invaluable resource for drug creation, either in their native form or after crude extraction of their active constituents. The introduction of specialized chemoinformatic techniques, advancements in computing power, and the evolution of isolation and characterisation techniques have all contributed to the smooth transition from conventional ethnopharmacology to drug discovery. Though there hasn't been a corresponding rise in new pharmaceuticals, the broad exploitation of the chemical space of natural products has resulted in the discovery of novel molecules with pharmacological capabilities. All around the world, but especially in Africa, traditional medicine (TM) is a significant resource for the management of primary healthcare. The standard of patient treatment can be raised by quality improvement initiatives that support evidence-based procedures and the incorporation of conventional medicine into primary healthcare systems. Depending on the illnesses and the medicinal plants utilized, traditional medicine practitioners (TMPs) in the Republic of Benin (West Africa) offer various treatments and methods of use.

Keywords: Ethnopharmacology, Drug development, Pharmacological testing, Traditional medicines.

Introduction:

Traditional medicines is used for purpose of treating, diagnosis, and prevention of diseases as well for overall health maintainace which is used in combination with plants, animal parts, minerals, spiritual therapies, techniques and manual exercises[1]. For over 80% of population in developing countries traditional medicines is primary form[2]. Traditional medicines intregration into morden health systems is still in progress, the law was established since 1990s[3]. Since the beginning of their evolutionary history, humans have possessed distinct pharmacological knowledge on the medicinal qualities of plants, leaving traces in both prehistoric and subsequent cultural heritage[4.] Nevertheless, there is a lot of pressure on the scientific community to produce information about the efficacy and safety of natural extracts because of the aspects of ethnopharmacological knowledge and practice that are used either in addition to or in tandem with the official treatment of diseases. The application of plant extracts as pharmacological agents, which contain hundreds of compounds[5]. This is fueled by the building of sizable public libraries of chemical (and natural) compounds, the great multiplicity of processing capacity, and the notable growth in the detection and precision limitations of analytical procedures [6]. While many commonly used medications are derived from natural products, some notable medications, like vinblastine, quinine and artemisinin have their roots in traditional medicine and ethnopharmacology Nevertheless, these medications have since been synthesized using modern chemistry and have been reevaluated using contemporary analytical and pharmacological techniques[7].



Innovative extraction technologies have made it possible to reevaluate the body of conventional knowledge, determine the chemical components of plant extracts, identify "active compound(s)," and develop novel drugs in recent years. These technologies include semi-bionic extraction, supercritical fluid extraction, microwave-, ultrasonic-, and enzyme-assisted extraction; molecular distillation methods; membrane separation technology; and sophisticated new methodologies and instrumentation like HPLC-MS, LC-MS, GC-MS, NMR, and crystallography[9]. A vast array of specialized secondary metabolites, containing a multitude of active or complimentary chemicals, are synthesized by plants. The high biodiversity of plants found in many parts of the world, their ecological significance in plant physiology, which is related to the wide range of problems that plants face (protection from pathogens, herbivores, stress, including UV protection), interactions with other plants and animals, etc.), and the fact that different evolutionary solutions have emerged for the same problem in divergent plant lineages with identical or similar pharmacological action are some of the reasons for this[10]. The largest and most significant economic sector in Pakistan is agriculture, which accounts for 23.3% of the country's GDP. Livestock is crucial to the agriculture industry, and with a population of up to 167.5 million in Pakistan, it accounts for 51.1% of the country's total economic output[11]. Ethnopharmacology helps to create safer and more effective medications by fusing traditional knowledge with cutting-edge scientific methods. The field of ethnopharmacology emphasizes the significance of sustainable practices and biodiversity conservation[12]. By confirming the security and effectiveness of conventional treatments, locating promising medication candidates, and encouraging partnerships between traditional healers and scientists, ethnopharmacology helps to close the gap between traditional medicine and contemporary healthcare[13].

Methods:

Data Collection: With a few minor adjustments, we employed the semi-structured interview technique previously described for data collection[14]. They met the following requirements to be chosen: they had to have created at least one herbal product, be proficient in both reading and writing French, have legal recognition as TMPs in Benin, and voluntarily choose to take part in the study[15].

Data Analysis: Numbers and percentages were used to express the descriptive variables for the whole study population. Version 9 of the Prism software was used for statistical analysis. The WFO Plant List and the analytical Flora of Benin12 were used to confirm the scientific and native names of the plants[16].

Data Quality Assurance: Every respondent was seen or contacted three times or more during the data collection process to ensure the accuracy of the information they submitted. Any concept that differed from the original information supplied by the respondent was disregarded and deemed irrelevant information. Only pertinent data was subjected to additional analysis. By properly educating data collectors, pointing out missing information, duplication of material, and rigorous analysis, further data quality was secured[17].

Data Organization And Analysis: There were five main occupations for both genders: labor, housewives, shopkeepers, farmers, and primary teachers. Three classes—herb, shrub, and tree—were used to group plant habits. Leaf, stem, root, whole plant, seeds, buds, bulb, and fruit were the different categories for plant parts. The functions of medicinal plants were divided into seven main categories: gastrointestinal, dermatological, ocular, respiratory, reproductive, mastitis, and muscular. The following categories were used to classify the recipes: decoction, powder, crushed, juice, paste, poultice, and infusion. Oral, cutaneous, and nasal routes of delivery were separated into three groups[18].

Fidelity Level: Finding the most popular plants that responders use to treat various livestock problems can be done with the use of fidelity level (FL). Higher FL values are found in highly desired plants compared to less liked ones. FL values are always determined as the percentage of informants who state that a particular plant species is used to treat a given condition[19].

Collection and Preservation of Medicinal Plants: Field expeditions were conducted with local informants in order to gather the studyrea's reported medicinal plant collection. These gathered medications were taken to the Kohat University of Science and Technology (KUST) laboratory in Kohat, Pakistan, for additional processing, where they were handled normally[20]. The article authors' names, family names, and scientific names were updated based on the software index Kewensis and Pakistani flora. The plants were placed in the Herbarium of the Department of Botany at KUST in Kohat, Pakistan, after being dried and compressed on herbarium sheets[21].

Evolution of Natural Product Derived Drug Devlopment:

Conversely, ethnopharmacology is the multidisciplinary scientific study of biologically active substances and historically used native medicines. Therefore, the study of physiologically active substances from plants, minerals, animals, fungi, and microbes is a larger focus of ethnopharmacology[22] The field investigations of indigenous and traditional medicinal knowledge, as well as the biodiversity component to which such information is tied, have benefited greatly from ethnopharmacology[23]. However, some aspects of the therapeutic qualities of the plants have persisted in western societies, which have largely lost their ancient healing practices. The ethnopharmacological use of plants is supported by phytotherapists and naturopaths who work in alternative and complementary healthcare organizations. Some nations have associations that recognize qualified members, and they go through training that is largely regulated (by responsible authorities)[24]. Preparing the Agency's views on the safety of herbal medicines is the responsibility of the European Medicines Agency (EMA) in collaboration with the Committee on Herbal Medicinal Products (HMPC)[25].

Pharmacological Testing:

They demonstrated that while studies on the identification of medicinal plant species utilized in traditional medicine continue, there has been a significant surge in the assessment of the particular characteristics or therapeutic effects of extracts and chemicals[26]. The focus of research is now shifting from identifying and cataloging the species of medicinal plants used in traditional medicine to assessing the unique qualities or therapeutic benefits of crude plant extracts or specialized naturally derived products[27].

Future of Ethnopharmacology:

The integration of cutting-edge analytical methods, such as metabolomics and genomes, with ethnopharmacology would enable researchers to better understand the intricate relationships that medicinal plants have with human bodies. Furthermore, the integration of cutting-edge technologies like high-throughput screening and artificial intelligence with conventional knowledge could lead to the identification of new medicinal medicines. Beyond the scientific study of therapeutic plants lies ethnopharmacology. It also emphasizes the empowerment of indigenous communities and the preservation of their culture. Communities' cultural history and identity are closely entwined with traditional healing systems. Respecting the experience and wisdom of local healers and community members, ethnopharmacologists collaborate with them. Ethnopharmacology supports the preservation of cultural traditions and gives indigenous groups the authority to continue using their own healing methods by recognizing and approving their customs[28].

The study of ethnopharmacology has enormous promise for the synthesis of novel therapeutics and the identification of new medications. The combination of traditional knowledge with cutting-edge techniques like metabolomics, genomics, and artificial intelligence can hasten the identification and development of novel therapeutic medicines as long as technological developments persist. Additionally, investigating the synergistic interactions between conventional medications and traditional medicines may result in better therapeutic outcomes.

Moreover, encouraging cooperation between scientists, pharmaceutical companies, and traditional healers can guarantee the long-term growth and marketability of ethnomedicinal goods[29].

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