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Recent perspectives on impact of Ethnobotany in India: A review

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Abstract

Medicinal and aromatic plants constitute most significant group of plants in the welfare of living beings. Most of these plants are found growing wild and collected by different ethnic and rural people of our country. They used them freely for the treatment of various human and animal ailments, on the basis of their ancestral knowledge and beliefs. They know medicinal usage of several wild plants growing nearby them for the sure cure of different diseases. Ethnobotany, the research field of science, has been widely used in documenting the indigenous knowledge of using plants and providing an inventory of useful plants from local ethnic people. Plants that are used as traditional herbal medicine in different countries are an important part of these studies. However, over-harvesting, degradation of medicinal plants, and loss of indigenous traditional knowledge from local communities are common problems in these resource areas. In this narrative review of literature, we aimed to describe and delineate about recent perspectives on role and impact of Ethnobotany in India.

Keywords: Ethnobotany, Tribals and rural communities, Ethnoveterinary medicine, resources

Introduction

India is a vast country with a variety of topographies, climates, vegetation, and people. In India, the Ethnobotany can be divided into two groups of people, i.e., those living in small cities or rural villages and tribal peoples who live in remote villages. The population of India is approximately 102 million, out of which about 50 million people belong to 550 tribal communities or aboriginals. There are 325 total languages with a large number of dialects spoken within the country, of which 18 are official including English, Sanskrit, and Urdu. In Asia, there are various written accounts which testify to the usefulness of himalayan herbs for medicinal purposes. Perhaps the earliest use of herbal plants was documented in the Vedas in about 4500 to 600 B.C. which represents the oldest repository of human knowledge, and comprises 67 plant species. Ayurveda (a traditional medicine system practiced widely in India) provides further details for the therapeutic use of more than herbal drugs ^[1].

Biodiversity provides number of essential services naturally like crop production and protection, soil fertility, nature conservation with the aim of availability of natural resources to all living beings. Indian Ethnobotanical study is as old as human civilization and is one of the richest cultural traditions associated with the diverse uses of medicinal and aromatic plants. Many ancient religious literatures show a great heritage of herbal treatments. Several ethnic groups and rural people have possessed vast experience of different usage of medicinal and aromatic plants growing nearby them in the treatment of many human and veterinary ailments. They developed their own system of knowledge pertaining to sustainable use of plant resources, animals and natural wealth through repeated experimentation and by trial and error methods. Men of olden times were wise enough and had reliable know how about several plant to fulfill their daily needs of life. Among the usage of plants, medicinal plants constitute the main group. Medicinal and aromatic plants constitute most significant group of plants in the welfare of living beings. Most of these plants are found growing wild and collected by different ethnic and rural people of our country. They used them freely for the treatment of various human and animal ailments, on the basis of their ancestral knowledge and beliefs. They know medicinal usage of several wild plants growing nearby them for the sure cure of different diseases ^[2]. Furthermore, As reported by the World Health Organization (WHO), approximately 80% of the human population relies on traditional botanical medicines worldwide. Around 40,000 to 70,000 medicinal plant species are utilized across the world as traditional medicines ^[3].

Currently, the world trade in medicinal plants and derived products is evaluated at US\$ 100 billion with an annual growth rate of 15% [4].

The complementary or traditional medicinal system along with the presence of several cultural and socio-religious practices plays a major role in healthcare throughout the Indian subcontinent. Complementary and Alternative Medicine (CAM) in the field of dermatology covers a wide variety of diagnosis and treatment methods that complement conventional dermatology practices by drawing on an extended knowledge base that includes CAM together with the latest research findings. CAM mainly focuses on treating the human body as a whole in the hope that this approach will benefit the dermatological treatment [5]. With this scenario in the current narrative review of literature study we aimed to describe and delineate on recent views on impact of ethnobotany in India.

Ethnic Knowledge

Ethnic people possess a deep and vast knowledge about the traditional knowledge system world over which has been a gift to civilized population. This knowledge is based on generation long experience of tribal people which has been passing from generation to generation in a very natural way. In fact, it is the "Green Economy". This knowledge is community specific functional knowledge generated, preserved and carried over by these ethnic and rural people from generations and based on interactions, observations and experiences. Ethnic knowledge serves as a natural tool to encounter different day to-day requirements like food, shelter, cloth of Living beings. Apart from it, ethnic communities are also providing sustainable herbal and natural solutions for the various human and veterinary ailments which can create possibilities of Income generation to rural and unorganized sector for alleviation of poverty. According to estimation approximately 80% of world's population depends upon plants as primary medicines. Traditional knowledge Digital Library is developed by Government of India in order to preserve all type of traditional knowledge like Ayurveda, Unani, Siddha and Yoga and prevent any possible misuse of this ethical knowledge. The chief motive of this library is to preserve and protect the ethical knowledge of India from any sort of exploitation as bio piracy and unethical patents [6].

Many of the traditional methods and general knowledge of medicinal flora is being lost to time. As healers and tribal elders age and die, their knowledge is also lost with them. Scientists are still searching the ways to preserve this knowledge and to test them against contemporary diseases. It has been reported that less than 5% of tropical forest plant species have been examined for their chemical compounds and medicinal value. The potential of the medicinal plants is still untouched, but the loss of forests due to excessive felling leads to extinction of unexplored medicinal plant species. A study conducted in Chhindwara, Madhya Pradesh, India found that there is a profound and growing knowledge gap between old and younger generations. People of more than 50-65 years age know a lot about wild plant products as compared to younger generation [7].

Impact of Ethnobotany on society

There has been tremendous transition in the economies from subsistence to market-based in over last quarter century which have created a serious impact on overall aspects of traditional medical systems by affecting indigenous medicines, resource data base and environment. Over-harvesting of medicinal

plants and animal species have resulted in exploitation, loss of biodiversity, and the loss of indigenous medical knowledge and traditions. This lead to a breakdown of traditional medical systems. Moreover, the exploitation of traditional herbal medicine for the creation and development of new drugs for allopathic treatments which reduces the demand of traditional medicine. The tribals have adopted the culture and customs of other indigenous tribes like bhil, Garasia, Meena etc... Damors (0.75%) though poorly represented, but find scattered distribution all over state except Bikaner, Churu, Bharatpur, Jhunjhunu, Alwar and Nagaur district. Kathodi tribe (0.06%) inhabits Udaipur and Kota district and Bhil-Meena (0.65%), more concentrated in Ajmer, may also be observed in Jaipur, Ganganagar, Jalore, Udaipur, Dungarpur and Banswara district. These tribes have their own tribal features and have accrued considerable knowledge of flora and fauna in the environment. The indigenous societies of different regions of the world have discovered various uses of natural resources around them. This traditional knowledge is based on their necessities, instinct, observation, trial and error and long experience. The medicinal uses of plant and animal products are an important component of such indigenous knowledge. Some of this knowledge got widely tested and accepted over period of time, and became part of the recognized or codified indigenous systems of medicine (ISM) namely, the Ayurveda, Siddha and Yunani in India. For wider, more reliable and scientific application of this knowledge, researchers are continuously subjecting it to a variety of tests through field, laboratory or clinical research [6].

Impact of Ethnobotany of Education

Ethnobotany has become more fascinating today, than at any time in the history. However, it suffers from many deficiencies, especially the lack of research support, educational opportunities, theoretical basis as well as problem of understanding the dialect of tribals. Ethno botanists should expand the definition of Ethnobotany to include all plant people interactions, not

Just those of traditional societies. The Ethnobotany should be integrated with biological studies, like botany, anthropology to gain maximum traditional linkages. These can be used in the conservation of biology, resource management, and environmental education. Expanding ethno botany's scope to include all plant and human interactions greatly increases the funding, research, and job opportunities for the discipline [8]. With the intention of taking students back to grandmother's remedies and to the wonders of traditional medicine, the National Medicinal Plants Board, Govt. of India New Delhi is introducing the concept of herbal gardens in various schools across the country from early 2010. As per the NMPB, the herbal gardens project will initially cover 1,000 schools in 50 districts across the country [6].

Status of Ethnobotany in Skin Diseases

Use of medicinal plants in amelioration of human skin diseases in India is still a subject to conduct more studies to see if there is chemical, microbiological, and/or clinical evidence from a scientific perspective of their effectiveness for those skin disorders. However, the knowledge of herbal medicine is being used to treat different kinds of human skin disorders by local people. In the Indian subcontinent, complementary therapy for dermatological problems and treatment remains the main option for millions of people.

Administration of extracts from most of plant species is topical and few only are administrated orally. Studies the

pharmacological activity of the extracts of the most cited plants against mice, bacterial and fungal pathogens, and human cells confirmed that more studies and clinical evidences are still required to determine if the identified species may contribute to skin condition treatment, particularly in atopic eczema [9]. Today, ethnodermatology is a well-accepted international discipline and many new practices have been initiated in numerous countries. The topic is of supreme significance since many skin conditions are reportedly treated by the traditional medicines alongside the western medications as alternative or in conjunction. Substantial evidence supports the efficacy of traditional formulations, but the safety issues are also needed to be remembered that may accompany the application of such medicines. In this context, research on plants utilized in ethnodermatology in India and elsewhere should be intensified with further systematic and rigorous research is needed for analyses and testing of traditional dermatological preparations that may eventually guide to formulate novel therapeutics against skin disorders [10].

Perspectives on Ethnobotany in Veterinary Medicine

From the beginning of human civilization, the need for animal domestication was realized by the ancient people in every step of their shifted livelihood from hunting to farming. Over the past 11,000 years, varieties of animals have been domesticated by humans for food, secondary products, labor, and companionship [11, 12]. In India, the tradition of livestock rearing is prehistoric and sacrosanct. To date, livestock plays a vital role in shaping the rural economy by providing livelihood to two-thirds of rural communities, mainly the landless daily laborers, marginal and small-scale farmers, and women [13]. Simultaneous developments of traditional healthcare management systems for domesticated animals have been shaped according to the continuous evolution of knowledge, culture, and local biodiversity. Traditional knowledge associated with the healthcare management of livestock is the basis of Ethnoveterinary medicine. It includes people's understanding, expertise, approach, way of application, and faith. Documentation of this age-old non-codified traditional knowledge for its larger prospects and academic interest has revolved around the wheel of research in ethnobotany that deals with the multidisciplinary approach of people-plant interactions [14].

In animal health care, the use of plants as supporting therapy in preventive purposes or as a complete therapy has a huge potential regardless whether it is the question of individual or combined plant medicinal preparations which act synergistically. It is possible to direct medicinal action of plants into certain direction, to strengthen or alleviate their action by combining certain features of some plants and their preparations. In phytotherapy whole plants are used, then their parts drugs with structures of organized drug (over-ground and underground plant organs) and drugs without structures non-cell drug (milk juice, ether oil, wax, mucus, balsam), ingredients and preparations. Teas, decoctions, extracts (watery, alcohol, watery-alcohol, oily), tinctures, macerations, solutions, syrups, bathing soaps, creams, lotions, pills, tablets are prepared from medicinal and other plants. In veterinary medicine the use of some forms of plants is to a certain degree limited because of the absence of cooperation with the patient on one hand while on the other the forms intended exclusively to animals are not available currently. Active principles of plants belong to the group of secondary metabolites created by metabolic modifications of products of primary

metabolism (carbohydrates, amino acids and fatty acids). Secondary plant metabolites are of very versatile chemical composition and different pharmacological action and they include heterosides, alkaloids, saponosides, terpenoides, tannins, flavonoids. Taxonomically related plants mostly produce chemically similar, but not the same metabolites, therefore their pharmacological effects are similar, but they cannot replace one another in prevention and treatment of human and animal diseases. Phytotherapy is very intensively used in prophylactic purposes with the aim of treatment of milder forms of diseases, chronic diseases and recurrent infections as well as in organic livestock production. Phytotherapeutics (plant extracts, essence, etc...) and homeopathic products (vegetable, animal and mineral substances) have advantage over synthetic-chemical veterinary preparations in organic livestock production in case they ensure positive therapeutic effects in animals [15].

Mandal *et al.*, conducted a research investigation with the main aim to document traditional knowledge of ethnoveterinary medicine (EVM) from the northern laterite region in eastern India. Authors collected The Ethnoveterinary medicinal data using a semi-structured questionnaire, free listing, and focus group discussions. The factor for informants' consensus (Fic), fidelity level (FL), and cultural value (CV) index have been employed for quantitative analyses. Jaccard index (JI) was used to check the knowledge similarity. Altogether, 1,234 citations were made by 132 participants. In total, 232 recorded ethnomedicinal species are used for preparing 306 remedies to treat 79 health disorders of livestock. Recorded species are distributed in 92 families, and Fabaceae is identified as the most medicinally diversified. Uses of 24 angiospermic taxa, one Pteridophyte, and two fungal species were exclusively new to the existing inventory of Indian traditional Ethnoveterinary medicine. In 20 disease categories, the informant consensus (Fic) value ranges from 0.4 to 0.83. According to the FL value and use-mention factor, 23 EVM plants have been identified as the most important species in the respective disease categories. Value of CV index highlighted nine species as culturally most significant ($CV \geq 0.0025$ and frequency of citation ≥ 20) in the laterite region of eastern India. A large extent of recorded data are quite worthy for the Indian folk veterinary medicinal repository [16].

The Central Indian region consists mainly with Madhya Pradesh and Chhattisgarh states of India and occupied the core zone of the country. The various tribal communities comprise about 24% population of Central India. The scrutiny of literature on Ethnoveterinary medicines of Central India indicates that there are about 270 plant species under 218 genera and 84 families are used by tribal and rural communities of Central India for the treatment of 139 types of different ailments, diseases and disorders of their pet/domestic animals. This indigenous knowledge and practice of tribal and rural people is based primarily on locally available medicinal plants found in their surroundings [17].

Status on Medicinal Plant Resources

In India most of the demand of medicinal and aromatic plants is fulfilled from wild resources especially from the forests both by tribal and industries. To maintain the uninterrupted supply of this raw material to domestic plant based pharmaceutical industries in India, it is necessary to undertake large scale cultivation of high value medicinal plants to replace traditional agriculture. Large scale cultivation of most valued medicinal plants is the only alternative to minimize

heavy destruction and uncontrolled harvesting from wild natural resources. For the said purpose, central and state governments have banned the trade and export of 29 such rare and threatened plants. Conservation and sustainable harvesting of these endangered plant sources, including medicinal and aromatic plants has been kept on major priority, in order to check heavy loss to plant diversity. According to recent investigative study by the Ministry of Environment of Forests (MoEF), Government of India, under All India Coordinate Research Project on Ethnobiology (AICRPE), the ethnic communities in India are using more than 10000 wild plants in various therapies, edible and other miscellaneous uses. Among these, 800 plants are used for different medicinal purposes by the Indian tribal people^[18].

Like medicinal plant resources aromatic plants of India also have an ancient history in human civilization. Trade of aromatic plants from India through sea passage is very old as mentioned in different religious and historical literature. Various spices like pepper, cardamom, ginger, and sandal wood were taken from Indian western coast and exported to different countries of the world. According to a survey of aromatic plants of India, approximately 3000 plant species of 60 main families, have the aromatic value which are using in different aroma purposes like in medicines, soaps, cosmetics, perfumes, pharmaceuticals, textiles, confectionary, freshners, deodorants, paints, disinfectants, insecticides and pesticides etc...^[19].

Summary and Future Perspectives

Ethno botanical research can be considered as connecting link of medicine both past and present in term of plants and the traditional societies. It is an important tool in development of pharmaceuticals and medicine industry. The complementary therapy for dermatological problems and treatment remains the main option for millions of people in the Indian subcontinent. These characteristics of the Ethnoveterinary knowledge articulate its vitality and also the flexibility of its many of the knowledge spheres. The greater part of this vast knowledge trove is confined to the aged people domain, not to the younger generation in the society. This is a very alarming concern identified in the context of sustainability of Ethnoveterinary medicine knowledge system.

In the future, Ethnobotany may play an increasingly important role in sustainable development and biodiversity conservation. Thus, breaking the forbidden chains between indigenous traditional knowledge and development. However, in order to cope up with increasing demand of medicinal and aromatic plants world over especially in pharmaceutical and nutraceutical industries, it is necessary for our country to maintain a balance between availability and supply. Hence it is a need of hour to develop appropriate technologies to fulfill present and future demands in most sustainable and balanced ways. One of the effective methods in this regard is to implement commercial cultivation practices for most of medicinal and aromatic plants.

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