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REVIEW ARTICLE

A comprehensive review on the ethnopharmacological and therapeutic perspectives of psychoactive plants

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ABSTRACT

Psychoactive plants have been an integral part of human societies for centuries, serving various cultural, spiritual, and therapeutic purposes. This review explores the ethnopharmacological and therapeutic aspects of psychoactive plants. The present study emphasizes existing knowledge on the psychoactive constituents and pharmacological properties of certain plants, shedding light on their psychoactive effects and potential therapeutic applications. Additionally, the present review examines the challenges associated with the use of psychoactive plants, including legal and ethical considerations by amalgamating ethnopharmacological insights with modern scientific perspectives, the current study explores comprehensive understanding of the multifaceted nature of psychoactive plants, emphasizing the need for balanced approaches that respect cultural heritage while ensuring safety and promoting responsible use of green medicine in contemporary society.

Keywords: Psychoactive plants, Traditional Medicine, Ethnopharmacology, Therapeutic Uses, Phytoconstituents

1. INTRODUCTION

Psychoactive plants are consumed in various preparations to influence the mind and alter consciousness. In pharmacology, they are known as mind-altering substances and are categorized as stimulants, sedatives, hypnotics, and hallucinogens. Despite the psychoactive uses they have high medicinal and ethnobotanical use. They also play a significant role in human history, influencing cultures, rituals and even shaping diverse civilizations. Throughout history psychoactive plants have held importance in cultures providing a wealth of traditional knowledge and healing practices. These plants have served as remedies, for ailments and have played a pivotal role in facilitating spiritual experiences. In medicine they are usually used for pain relief like cannabis and Opium poppy to help ease pain and provide relief. In the field of healthcare there are research on the potential benefits of psychoactive plants such as psilocybin mushrooms and Ayahuasca in treating conditions, like depression and PTSD (Post-traumatic stress disorder). Indigenous communities have incorporated long run use of these plants into their healing practices, which focus on both the spiritual aspects of wellbeing. Ethnobotanical uses include spiritual and religious ceremonies; Indigenous rituals often incorporate plants such, as Peyote and Ayahuasca which are considered sacred. These plants help individuals enter states of consciousness and experience revelations. Throughout history psychoactive plants have played a vital role in rites of passage initiation ceremonies and fostering communal bonds among people. In cultures, psychoactive plants are also used as tools for divination. By entering altered states induced by these plants individuals seek guidance or gain insights, into aspects of life [1]

Although psychoactive plants have had an impact, throughout history and their utilization raises ethical and legal issues. As societies navigate these complexities, ongoing studies strive to explore their therapeutic possibilities while also respecting customs and promoting responsible practices and wellbeing of mankind.

2. MATERIALS AND METHODS

The present study reviews various articles related to psychoactive plants from different websites like Science direct (www.sciencedirect.com), Research gate (www.researchgate.com), Springer

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(www.springer.com) using the key words Psychoactive plants, medicinal and therapeutic uses and resulted in identification of a group of literatures relevant to the scope of this review.

3. LITERATURE REVIEW

ETHNOPHARMACOLOGY OF PSYCHOACTIVE PLANTS

In response to their adaptable enemies, plants have evolved to continuously adapt by producing defensive secondary metabolites. Notably, it is believed that this evolutionary rivalry gave rise to psychoactive substances including atropine, caffeine, cocaine, nicotine, and morphine. These drugs, which can include stimulants, sedatives, antidepressants, and hallucinogens, affect the neurological system and have an impact on mental and behavioral processes. In the neurological system, psychoactive substances have particular molecular targets that interact with neuronal receptors to create variety of effects. For example, the morphine found in Opium poppy plants reduces pain by attaching to opioid receptors and affects dopamine-containing neurons to provide drowsiness and bliss [2]. In the meantime, chemicals found in tobacco, such as nicotine, cause muscular contractions and activation of arousal and attention-related brain regions. Another alkaloid included in *Atropa belladonna*, called atropine, functions as a muscarinic acetylcholine antagonist, causing drowsiness and incapacitation by obstructing neuromuscular communication. Popular psychoactive plants like marijuana and Opium poppy were historically used for various purposes, with THC in marijuana binding to cannabinoid receptors for sensory pleasure. Opium poppy's recorded use in ancient Egypt includes calming excessive crying in children, attributed to morphine and codeine in the plant [2].

Healers in the South American Amazon region make ayahuasca, a hallucinogenic drink, by boiling and crushing the stems of the caapi plant (*Banisteropsis caapi*, Malpighiaceae) and the leaves of the chacruna plant (*Psychotria viridis*, Rubiaceae). The beta-carbolines in caapi trigger the serotonergic N-dimethyltryptamine (DMT) found in chacruna. Indigenous peoples in the Andes chew the leaves of *Erythroxylum coca* (Erythroxylaceae) as a way to relieve the symptoms of hunger and exhaustion associated with hard labor. Because of its cocaine concentration, which inhibits dopamine absorption, it elevates mood and enhance uplift of energy [2].

4. OTHER THERAPEUTIC USES

Native to the Mediterranean region of Europe, *Peganum harmala* is used as a neurostimulant in the Middle East and Africa. *Argyreia nervosa*, on the other hand, is used as an analgesic and aphrodisiac in Ayurvedic medicine, and Hawaiians have been using it as a substitute for marijuana [2]. *Psilocybin* Mushrooms commonly known as Magic Mushrooms have a compound named Psilocybin and it has potential benefits in treating depression, anxiety and PSTD [3]. Psychoactive compounds like DMT (Dimethyltryptamine) from *Psychotria viridis*, MAOIs from *Banisteriopsis caapi* vine are also effective in treating depression and anxiety [4]. Cannabis consist of psychoactive compounds like Tetrahydrocannabinol (THC) and Cannabidiol (CBD). It is commonly used for pain management, nausea reduction (especially in cancer patients undergoing chemotherapy), and has potential anti-inflammatory effects [5].

Mytragyna speciosa is another important psychoactive plant with potent medicinal value. It is traditionally used for pain relief and managing opioid withdrawal. But it's safety and efficacy are subjects of pursuing research. Mytragynine is a psychoactive compound present in this plant [6]. Another plant named *Tabernanthe iboga* contains psychoactive compound namely Ibogaine having potential in treating addiction especially to opoids. But it should be administered under strict medical supervision [7]. *Piper methysticum* contains psychoactive compound Kavalactones, traditionally used in the South Pacific regions for its calming and anxiolytic effects and it have been studied for its potential in managing anxiety [8]. *Nymphaea caerulea* commonly known as Blue Lotus have psychoactive compounds like Nuciferine and Aporphine used traditionally in ancient Egyptian and Mayan cultures for its psychoactive and aphrodisiac effects [9]. *Turnera diffusa* is another psychoactive plant which contains bioconstituents like Damianin and Pinocembrin; which is traditionally used as an aphrodisiac and for its potential mood-enhancing properties [10].

Lactuca virosa commonly known as wild lettuce contains Lactucin and Lactucopicrin are used traditionally for its calming and sedative effects, sometimes referred to as a mild natural opiate [11]. *Heimia salicifolia* is another prominent psychoactive plant. In Mexican folk medicine it is regarded as a narcotic, inebriant and diuretic. The drink brewed from *Heimia salicifolia* produces psychoactive effects [12].

Table 1. List of psychoactive plants and their medicinal properties

S. No.	Plant	Family	Psychoactive compounds	Medicinal uses	Reference
1.	*Erythroxylum coca* Lam.	Erythroxylaceae	Cocaine	Used as local anaesthetic	[13]
2.	*Peganum harmala* L.	Zygophyllaceae	Harmine, Carboline and quinazoline alkaloids	Neurostimulant, analgesic and aphrodisiac.	[2,14]
3.	*Psychotria viridis* Ruiz&Pav.	Rubiaceae	Dimethyltryptamine	Anti-depressant, anticancerous	[15]
4.	*Cannabis sativa* L.	Cannabaceae	Tetrahydrocannabinol and Cannabidiol	Pain management, nausea reduction, neuroprotective, anti-inflammatory	[16]
5.	*Mytragyna speciosa* Korth.	Rubiaceae	Mytragynine	Pain relief, managing opioid withdrawal	[17]
6.	*Tabernanthe iboga* Baill.	Apocynaceae	Ibogaine	Central stimulant, managing opioid addiction	[18]
7.	*Piper methysticum* G.Frost.	Piperaceae	Methysticum, Kavalactones	Calming and anxiety management	[19]
8.	*Nymphaea caerulea* Verdc.	Nymphaeaceae	Nuciferine and Aporphine	To cure insomnia, schizophrenia, Parkinson's disease, erectile dysfunction, aphrodisiac and anti-depressant	[20]
9.	*Turnera diffusa* Wild.ex Schult.	Passifloraceae	Damianin and Pinocembrin	Calming agent, anti-depressant	[21]
10.	*Lactusa virosa* Thumb.	Asteraceae	Lactucin and Lactucopicrin	Pain relief, anti-inflammatory, anticonvulsant, sedative-hypnotic	[22]
11.	*Heimia salicifolia* Kunth.	Lythraceae	Lythrine	Wound healing, anti-inflammatory, antisyphilitic, anti-depressant	[23, 24]
12.	*Thymus vulgaris* L.	Lamiaceae	Thymol	Stimulant	[25]
13.	*Papaver somniferum* L.	Papavaraceae	Opium	Pain relief, analgesic, insomnia	[25]
14.	*Coffea arabica* L.	Rubiaceae	Caffeine	Central stimulant, Opium antidote	[25]

5. LEGAL AND ETHICAL CHALLENGES

The use of psychoactive plants presents complex legal and ethical dilemmas that cast doubt on the limits of personal freedom, public safety, and cultural customs. The legal frameworks governing the production, distribution, and use of plant-based psychoactive compounds are becoming more complicated to navigate as society struggles with the changing nature of these substances. Discussions about potential hazards, medical advantages, and personal freedom are all intertwined with ethical considerations. Researchers underscore the necessity of adopting regulatory strategies that strike a balance between acknowledging cultural

norms and individual rights, as well as public health concerns. In order to cope up with recent practices and policies, it is necessary to have a thorough awareness of both the legal environment and ethical dimensions. Legal precedents and changing society attitudes are the two important ongoing factors that contribute to the discourse of surrounding psychoactive plants [12].

6. CONCLUSION

Investigating the medicinal and ethnobotanical significance of psychoactive plants, it highlights the intricate relationship that these plants have with human cultures and health. Although these plants have been valued for their cultural and medical properties, a balanced knowledge of their advantages and disadvantages is essential for promoting safe and ultimate usage. The potential for using psychoactive plants for therapeutic purposes can be realized by merely balancing rigorous scientific research and validation with respect to traditional wisdom, all the while maintaining the safety and wellbeing of the individuals and communities.

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