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Medicinal plants of India: Bridging traditional wisdom and modern healthcare

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Abstract

Medicinal plants play a vital role in traditional and primary healthcare systems worldwide, particularly in developing nations where access to modern medicine remains limited. India stands out as one of the world's richest centres of ethnomedicinal diversity, home to more than 7,500 plant species that are actively used within its classical healing traditions like Ayurveda, Siddha and Unani as well as in regional folk medicine practices passed down through generations. Over 50 research findings to examine the ethnobotanical significance, pharmacological properties, and therapeutic potential of Indian medicinal plants. Accumulated traditional knowledge highlights their widespread use in managing a broad range of health conditions, including inflammatory disorders, skin diseases, digestive complaints, and maternal health concerns. Crucially, modern scientific investigations have increasingly validated many of these traditional claims. Species such as *Curcuma longa* (turmeric), *Ocimum sanctum* (holy basil), *Withania somnifera* (ashwagandha), and *Azadirachta indica* (neem) have demonstrated notable antioxidant, antimicrobial, anti-inflammatory, anticancer, and adaptogenic activities in laboratory and clinical settings. Beyond their therapeutic value, medicinal plants make meaningful contributions to drug discovery pipelines, preventive healthcare strategies, and the economic livelihoods of rural and indigenous communities. However, their continued availability is increasingly threatened by overexploitation, habitat destruction, and the gradual erosion of traditional knowledge among younger generations. This review underscores the urgent need for rigorous scientific validation of plant-based remedies, alongside robust conservation frameworks and sustainable utilization practices. Bridging the gap between ethnobotanical heritage and evidence-based medicine is essential to preserving both biodiversity and the cultural wisdom embedded in India's rich healing traditions.

1. Introduction

Medicinal plants, also known as herbal plants, have served as indispensable natural resources for human healthcare since ancient times and continue to form the backbone of traditional medicinal systems worldwide. Across diverse cultures and geographical regions, plant-derived remedies have historically been utilized for disease prevention, treatment, and health promotion due to their accessibility, affordability, and therapeutic efficacy. According to the World Health Organization, approximately 80% of the global population relies on traditional plant-based medicine, either partially or entirely, for primary healthcare, particularly in developing and low-resource nations where access to modern medical infrastructure and pharmaceutical therapies remains limited (WHO, 2024). Beyond economic and infrastructural limitations, the widespread reliance on herbal medicine is closely tied to cultural acceptance, spiritual beliefs, and indigenous knowledge systems that continue to shape healthcare-seeking behaviour among local populations. Traditional medical systems such as Ayurveda, Siddha, and Unani in India, along with Traditional Chinese Medicine (TCM), remain highly trusted owing

to their long historical continuity and holistic therapeutic approach (WHO, 2023). The increasing global interest in medicinal plants is also attributed to the growing concerns regarding adverse effects and antimicrobial resistance. Consequently, herbal medicines are increasingly being explored as safer and sustainable therapeutic alternatives. Medicinal plants contain a vast diversity of bioactive phytochemicals shown in Figure 1 and also alkaloids like flavonoids, phenolics, glycosides, tannins, saponins, and terpenoids, which exhibit significant pharmacological activities, including antioxidant, anti-inflammatory, antimicrobial, antiviral, anticancer, antidiabetic, and immunomodulatory effects (Bhardwaj *et al.*, 2024). Modern pharmacological and phytochemical investigations have scientifically validated the therapeutic efficacy of several traditionally used medicinal plants against bacterial, fungal, and viral infections, as well as chronic metabolic and inflammatory disorders (Yadav *et al.*, 2024). Such evidence has substantially strengthened the scientific credibility of traditional medicine and promoted the development of phytopharmaceuticals, nutraceuticals, and plant-based functional foods.

Traditional herbal plants are extensively utilized for both prevention and treatment of infectious and non-communicable diseases. However, despite renewed interest in traditional medicine among younger generations and scientific communities, a substantial gap persists in the preservation and transmission of indigenous medicinal knowledge. Traditional ethnomedicinal practices have predominantly been passed down orally across generations by tribal healers, local practitioners, and elderly community members. Rapid urbanization,

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modernization, migration, changing lifestyles, and declining intergenerational interaction have significantly contributed to the erosion of this valuable traditional knowledge (UNESCO, 2023). Furthermore, climate change and environmental degradation, including devastating cyclonic storms, floods, droughts, forest fires, and deforestation, have severely threatened medicinal plant biodiversity and the conservation of several valuable species (Singh *et al.*, 2024). The gradual loss of medicinal plant resources and associated ethnobotanical knowledge represents not only a cultural concern but also a major scientific challenge, as these plants continue to provide promising leads for future drug discovery and therapeutic innovation. India is recognized globally as one of the richest repositories of medicinal plant diversity and traditional healthcare knowledge. Owing to its vast geographical, ecological, and cultural heterogeneity, the country possesses one of the oldest and most comprehensive systems integrating medicinal plants into healthcare practices. Traditional systems such as Ayurveda, Siddha, and Unani rely heavily upon India's floristic wealth, encompassing more than 7,500 plant species documented for medicinal use (Ministry of AYUSH, 2023). These medicinal plants are regarded as invaluable "natural treasures" because of their immense pharmacological potential, therapeutic versatility, and socio-economic significance. Indian traditional medicine emphasizes a holistic approach that integrates physical, mental, and spiritual well-being.

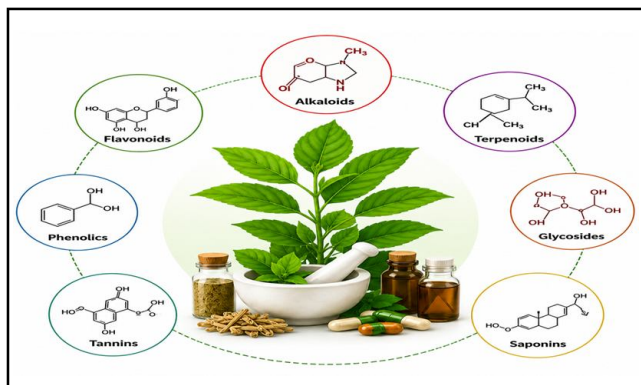


Figure 1: Natural and bioactive phytochemicals for health promotion and disease management.

Traditional medicinal knowledge inherited and transmitted through generations continues to play a central role in managing a wide spectrum of health conditions, particularly those associated with contemporary lifestyle transitions and socio-environmental stressors. Medicinal plants are widely employed in the treatment of maternal and reproductive health disorders, gastrointestinal ailments, respiratory infections, rheumatism, skin diseases, metabolic disorders, and infectious diseases in various indigenous and rural communities (Asaaga *et al.*, 2024; Sharma and Sharma, 2023). Simultaneously, modern biomedical research has increasingly validated these traditional therapeutic claims through advanced phytochemical profiling, molecular pharmacology, toxicological assessment, and clinical investigations. Numerous medicinal plants have demonstrated remarkable antioxidant, anti-inflammatory, antimicrobial, wound healing, hepatoprotective, neuroprotective, and immunomodulatory properties, thereby highlighting their potential in integrative healthcare systems (Vitale *et al.*, 2022; Sharma *et al.*, 2024).

The growing acceptance of naturopathy and evidence based phytomedicine has encouraged international organizations and healthcare policymakers to advocate for the integration of traditional medicinal practices into mainstream healthcare frameworks. The World Health Organization has emphasized the strategic importance of traditional medicine in achieving universal health coverage, sustainable healthcare delivery, and community-based wellness approaches (WHO, 2023). In recent years, interdisciplinary scientific advancements involving ethnobotany, pharmacognosy, metabolomics, biotechnology, and precision nutrition have further accelerated the exploration of medicinal plants for therapeutic applications. Therefore, the present review aims to comprehensively examine the ethnobotanical significance, phytochemical composition, pharmacological properties, antioxidant potential, traditional formulations, and therapeutic applications of medicinal plants in India, while emphasizing their crucial role in bridging traditional wisdom with modern healthcare systems.

2. Contemporary significance of ethnomedicinal and phytopharmaceutical research

Research on medicinal plants has gained substantial scientific and clinical importance on account of increasing global interest in plant-based therapeutics and integrative healthcare approaches. India has one of the world's richest traditions of using medicinal plants through established systems such as Ayurveda, Siddha, Unani, and tribal ethnomedicine, utilizing thousands of plant species for preventive and curative healthcare (Yadav *et al.*, 2024). Over the last few years, extensive pharmacological studies have provided scientific evidence supporting the therapeutic potential of numerous medicinal plants, thus facilitating their incorporation into contemporary healthcare systems (Sharma *et al.*, 2024). The scaling importance of medicinal plants is further emphasized by their potential to address major healthcare challenges, including antimicrobial resistance, the rising frequency of chronic non-communicable diseases, adverse effects associated with synthetic drugs, and high healthcare costs. Phytochemicals and bioactive components present in medicinal plants have shown a broad spectrum of biological activities like antioxidant, anti-inflammatory, antimicrobial, anticancer, immunomodulatory, and neuroprotective effects, highlighting their potential as novel therapeutic agents (Bhardwaj *et al.*, 2024).

Furthermore, research on medicinal plants plays a crucial role in the preservation and scientific validation of traditional ethnobotanical knowledge held by indigenous and tribal communities, which is increasingly threatened by urbanization and habitat loss. Systematic documentation and validation of traditional medicinal practices not only strengthen biodiversity conservation but also provide a foundation for future drug discovery and development initiatives (Singh *et al.*, 2024). By linking traditional healthcare practices with modern scientific advancements, medicinal plant studies promote the development of evidence-based phytomedicine and highlight the necessity for interdisciplinary partnership between ethnobotanists, pharmacologists, clinicians, and conservation scientists to advance sustainable plant-based healthcare solutions (Coopoosamy *et al.*, 2023).

3. Methodological approach for evidence synthesis

The present review article, entitled "Medicinal Plants of India: Bridging Traditional Wisdom and Modern Healthcare," was

developed using a comprehensive, and systematic narrative review methodology aimed at synthesizing existing knowledge concerning the ethnobotanical, phytochemical, pharmacological, and therapeutic aspects of medicinal plants in India. The review aims to amalgamate traditional medicinal knowledge with contemporary scientific evidence to provide holistic understanding of medicinal plants role in healthcare system. The methodology involved the identification, screening, selection, and interpretation of relevant published literature from multiple scientific databases, institutional reports, and government documents.

3.1 Literature search strategy

An extensive literature search was conducted using internationally recognized electronic databases, including Google Scholar, PubMed, Scopus, Web of Science, Science Direct, and World Health Organization reports. Additional information was retrieved from publications of the Ministry of AYUSH, UNESCO, and the Ministry of Tribal Affairs to obtain recent statistics and policy-related information regarding medicinal plants, traditional medicine, and indigenous healthcare systems. The search process was carried out using combinations of relevant keywords and Boolean operators such as “medicinal plants of India,” “ethnobotany,” “traditional medicine,” “Ayurveda,” “Siddha,” “Unani,” “phytomedicine,” “pharmacological activities,” “phytochemicals,” “therapeutic applications,” “Indian medicinal flora,” “herbal medicine,” “antioxidant properties,” “antimicrobial activities” and “traditional healthcare systems.” The search was primarily restricted to studies published in English between 2010 and 2025 to ensure inclusion of recent scientific developments while also incorporating selected classical and foundational studies of ethnobotanical significance.

3.2 Inclusion and exclusion criteria

Relevant studies were selected using predefined inclusion criteria. Research articles, review papers, ethnobotanical surveys, pharmacological studies, clinical investigations, governmental reports, and institutional publications related to Indian medicinal plants were included. Studies addressing phytochemical composition, therapeutic properties, ethnomedicinal uses, biological activities, and conservation aspects were also considered. Studies unrelated to Indian medicinal plants, duplicate publications, conference abstracts without full text, unpublished manuscripts, and non-English literature were excluded. Preference was given to peer-reviewed and indexed publications to ensure scientific reliability and authenticity.

3.3 Data collection and organization

Relevant information from the selected literature was systematically extracted and categorized under major thematic areas, including: ethnobotanical significance of medicinal plants, traditional healthcare systems, phytochemical composition, pharmacological properties, therapeutic and disease-specific applications. Antioxidant and antimicrobial activities. Nutraceutical and functional food applications and biodiversity conservation, and recent scientific developments in phytomedicine. Special emphasis was placed on medicinal plant species widely used in Indian traditional systems, such as *W. somnifera*, *C. longa*, *O. tenuiflorum*, *T. cordifolia*, *A. indica*, and *B. monnieri* due to their significant therapeutic relevance and extensive scientific investigation.

3.4 Analysis and interpretation of literature

The collected literature was critically analysed to establish relationships between traditional ethnomedicinal knowledge and modern pharmacological evidence. Comparative evaluation of findings from ethnobotanical surveys, phytochemical analyses, *in vitro* and *in vivo* studies, and clinical investigations was undertaken to identify therapeutic trends, validated medicinal properties, and research gaps. Additionally, the review examined emerging concepts such as evidence-based phytomedicine, integrative healthcare, nutraceutical development, precision medicine, and sustainable utilization of medicinal plant biodiversity. The present review exclusively utilized secondary data obtained from published scientific literature, institutional documents, and publicly accessible reports. Proper citation and acknowledgment of all sources were maintained throughout the manuscript in accordance with academic and ethical writing standards. The review was designed to provide a scientifically balanced and evidence-based synthesis of available literature without manipulation or misrepresentation of findings. The review primarily focuses on medicinal plants utilized within Indian traditional healthcare systems and their relevance in modern therapeutic applications. The scope includes ethnobotanical importance, pharmacological validation, antioxidant and antimicrobial properties, therapeutic applications, conservation concerns, and future prospects of medicinal plants in integrative healthcare. The study further aims to bridge traditional medicinal wisdom with contemporary scientific evidence to support sustainable healthcare development and future phytopharmaceutical research.

4. Phytomedicinal contribution

Indian medicinal plants contribute substantially to phytomedicine by serving as sources of biologically active compounds that support preventive and therapeutic healthcare. Several modern drugs have originated directly or indirectly from medicinal plants, emphasizing the pharmaceutical importance of phytochemical research. Plants such as *W. somnifera*, *C. longa*, *T. cordifolia*, *O. tenuiflorum*, *A. indica*, and *B. monnieri* have gained international recognition because of their broad pharmacological potential (Sharma *et al.*, 2024). Polyphenols, curcuminoids, flavonoids, and terpenes present in medicinal plants help reduce oxidative stress and inflammation, which are major contributors to chronic diseases, including diabetes, cardiovascular disorders, and neurodegenerative conditions. These phytochemicals are increasingly investigated for their protective roles in cellular and metabolic health (Bhardwaj *et al.*, 2024).

4.1 Antimicrobial and antiviral potential

Many Indian medicinal plants exhibit strong antibacterial, antifungal, antiviral, and antiparasitic properties. Medicinal herbs such as Neem, Tulsi, and Giloy contain phytoconstituents that inhibit pathogenic microorganisms and enhance host defence mechanisms. Such findings are particularly important in the context of rising antimicrobial resistance worldwide (Yadav *et al.*, 2024).

4.2 Immunomodulatory and apoptogenic effects

Indian medicinal plants are widely recognized for their immunomodulatory and adaptogenic properties. Herbs such as Ashwagandha and Tulsi have demonstrated potential to improve immune response, reduce stress, enhance physical endurance, and promote mental wellbeing. These properties make them valuable candidates for integrative and preventive medicine approaches (Coopooosamy *et al.*, 2023).

4.3 Anticancer and metabolic health applications

Several phytochemicals isolated from Indian medicinal plants exhibit antiproliferative, chemoprotective, and antidiabetic activities. Curcumin from turmeric, for example, has been extensively studied for its role in cancer prevention, glycemic regulation, lipid metabolism, and obesity management. Such findings indicate the growing role of phytomedicine in addressing lifestyle-related disorders (Bhardwaj *et al.*, 2024).

4.4 Contribution to nutraceuticals and functional foods

Medicinal plants are increasingly incorporated into herbal supplements, nutraceutical formulations, fortified beverages, and functional foods intended for preventive healthcare and wellness promotion. This emerging area represents an important convergence between traditional medicine, nutrition science, and the functional food industry (Sharma *et al.*, 2024).

4.5 Future role in integrative and precision medicine

Recent advances in genomics, metabolomics, bioinformatics, and phytochemical profiling are opening new opportunities for personalized phytomedicine approaches. Integrating traditional medicinal knowledge with modern biomedical research may contribute significantly to precision healthcare, novel drug development, and sustainable therapeutic innovations (Coopoosamy *et al.*, 2023). At the same time, the present review critically acknowledges the need for rigorous clinical validation, standardization of herbal formulations, toxicity assessment, dosage optimization, and stronger regulatory oversight. Contemporary scientific discourse emphasizes that traditional medicinal claims should be supported by evidence-based pharmacological and clinical studies to ensure safety, efficacy, and wider clinical acceptance (Rajpoot and Rao, 2024).

5. Ethnobotanical aspects of medicinal plants in India

India is recognized as one of the world's 17 megadiverse countries and possesses a vast wealth of herbal and medicinal plants that are closely associated with traditional healthcare systems. These plants play an important role in primary healthcare, nutrition, cultural practices, and livelihood security. Indigenous knowledge regarding medicinal plants is transmitted through generations, oral traditions, and formal and non-formal education. Such knowledge continues to support the treatment of common ailments, management of chronic diseases, and improvement of maternal and child health when used appropriately. Ethnobotany refers to the study of the relationship between communities and plants, particularly their medicinal uses. India harbours more than 7,500 plant species used in traditional medicine. Healthcare systems such as Ayurveda, Siddha, Unani, and indigenous folk practices largely depend on the country's rich medicinal plant diversity (Ministry of AYUSH, 2023; WHO, 2023). Tribal communities, comprising about 8.6% of India's population, are regarded as important custodians of ethnomedicinal knowledge preserved across generations (Ministry of Tribal Affairs, 2023).

Several ethnobotanical surveys have documented the extensive dependence of tribal communities on medicinal plants. Traditional healers use numerous plant species and herbal formulations for gastrointestinal disorders, skin diseases, respiratory ailments, bone-related conditions, and other chronic health problems (Bhattacharjya *et al.*, 2023). Studies from the Western Ghats reported the use of medicinal plants for treating wounds, skin diseases, and poisonous

bites (Sureshkumar *et al.*, 2022), while rural communities in Central India commonly relied on herbal remedies for cough, cold, gastrointestinal disorders, and chronic illnesses (Dixit and Ali, 2010).

Ethnobotanical studies also reveal considerable diversity in plant parts used for therapeutic purposes, with leaves, roots, and bark being the most frequently utilized because of their rich phytochemical composition. Rani *et al.* (2013) documented 50 plant species used to treat 26 diseases in Jammu and Kashmir, with leaves accounting for nearly 40% of medicinal preparations. Similarly, medicinal plants such as neem, tulsi, turmeric, and amla continue to be widely used in Punjab for treating fever, wounds, skin infections, and other common ailments (Kaur and Kaur, 2022). Recent investigations have highlighted both the therapeutic potential and conservation concerns associated with medicinal plants. Sharmila *et al.* (2018) reported the antimicrobial, anticancer, and anti-inflammatory properties of several medicinal species in Tamil Nadu, while also emphasizing the threats posed by habitat loss and overharvesting. Furthermore, Chaudhary *et al.* (2023) stressed the need to integrate ethnobotanical knowledge with biodiversity conservation strategies due to the increasing risk of knowledge erosion among younger generations. Overall, the ethnobotanical perspective underscores the dual importance of medicinal plants as valuable healthcare resources and components of biodiversity. Preserving traditional knowledge and integrating it with modern pharmacological research can contribute significantly to sustainable development, biodiversity conservation, and inclusive healthcare systems.

6. Therapeutic and pharmacological aspects of medicinal plants for healthcare

Evidently, medicinal plants have the potential to play a critical role in primary healthcare throughout the country, particularly among rural and tribal communities. This observation could be attributed to limited access to recent medicine. Undoubtedly, traditional knowledge is being passed down through generations, or inherited from elders serve as a foundation for healthcare practices. A recent ethnobotanical study in Punjab reported considerable awareness among rural women regarding the use of medicinal plants such as garlic, cumin, saffron, and other herbs for maternal and reproductive healthcare, reflecting the continued reliance on indigenous knowledge systems (Kaur *et al.*, 2020). The study found that such knowledge was mainly inherited from elders and supported by the easy availability of medicinal plants. Similarly, ethnobotanical investigations in Uttarakhand documented the practices of traditional healers, including bone setters, poison healers, and ethnoveterinary practitioners, highlighting the diversity of plant-based healthcare systems in Himalayan communities (Bisht *et al.*, 2022). These findings demonstrate the strong association between traditional healthcare practices and local flora.

Recent pharmacological and nutritional studies have emphasized the health-promoting properties of medicinal herbs from families such as Alliaceae/Amaryllidaceae, Lamiaceae, Apiaceae, and Zingiberaceae, along with functional ingredients like flaxseed, licorice root, and green tea due to their antioxidant, anti-inflammatory, antimicrobial, and therapeutic effects (Shakya, 2023). Dixit and Ali (2010) also confirmed the chemo preventive potential of antioxidant-rich medicinal plants against reactive oxygen species. Furthermore, Jyoti and Kaur (2016) reported that although knowledge of medicinal plants was widespread among Punjabi women, their actual use was

relatively limited among 240 rural and urban respondents, indicating a gradual decline in traditional practices among younger generations.

Evidence highlights the significant therapeutic potential of medicinal plants in managing various diseases and health conditions. *Aloe vera* has gained considerable importance in food, cosmetic, and pharmaceutical industries because of its wound-healing, anti-inflammatory, antidiabetic, antioxidant, antibacterial, antifungal, and antiviral properties (Hamman, 2023). Similarly, *O. sanctum* is widely recognized for its benefits in respiratory, digestive, inflammatory, stress-related, and cardiovascular disorders due to its antioxidant, anti-inflammatory, and immunomodulatory effects (Cohen, 2023). Recent studies have also suggested the role of these plants in cancer prevention. Pharmacological investigations have demonstrated the antibacterial and antifungal activities of *Kigelia Africana* against pathogens such as *Staphylococcus aureus* and *Candida albicans*, supporting its traditional medicinal use (Aremu *et al.*, 2022). Likewise, Sharmila *et al.* (2018) documented medicinal plants in Tamil Nadu possessing antibacterial, anticancer, antidiabetic, antiviral, antifungal, and anthelmintic properties, while also highlighting concerns regarding habitat loss and overexploitation of valuable species.

Furthermore, Gautam (2011) reported the effectiveness of plant-based medicines in treating disorders related to the stomach, skin, blood, bones, muscles, and memory. Anand *et al.* (2016) documented the predominance of medicinal plant families such as Euphorbiaceae and genera including *Euphorbia*, *Acacia*, *Albizia*, *Ficus*, *Ocimum*, *Phyllanthus*, *Solanum*, and *Zizyphus*, reflecting the rich diversity of Indian medicinal flora. Similarly, Rani *et al.* (2013) recorded the use of 50 plant species for treating 26 diseases, with leaves (40%) and roots (24%) being the most commonly used plant parts, and reported new medicinal applications of *A. bidentata*, *C. sativa*, and *S. monosperma*.

Medicinal plants have become increasingly important in pharmacological research because of their abundance of naturally occurring bioactive constituents and their wide-ranging therapeutic potential. Their medicinal properties are largely associated with the presence of diverse phytochemicals, including alkaloids, flavonoids, terpenes, phenolic compounds, glycosides, tannins, and saponins. These compounds exhibit numerous biological activities that contribute to disease prevention and treatment, such as antioxidant, anti-inflammatory, antimicrobial, antiviral, antifungal, antidiabetic, anticancer, cardioprotective, hepatoprotective, and neuroprotective effects. Research has shown that plant-derived compounds can influence various physiological and molecular processes by regulating oxidative stress, inflammatory responses, immune function, cell signalling pathways, and programmed cell death. The importance of medicinal plants in modern healthcare is further highlighted by the development of several pharmaceutical drugs from plant sources. Continuous advancements in phytochemical characterization, pharmacological evaluation, and clinical investigations have strengthened scientific understanding of their therapeutic efficacy and safety. As a result, medicinal plants continue to serve as valuable resources for the discovery of novel drugs and the development of effective, affordable, and sustainable healthcare solutions. In addition to their therapeutic applications, medicinal plants contribute significantly to public health, nutritional security, and sustainable

healthcare development. Many medicinal species possess both nutritional and medicinal attributes, making them valuable components of functional foods and nutraceutical products. The increasing scientific validation of traditional remedies has encouraged the development of plant-based formulations for preventive and complementary healthcare. Moreover, medicinal plants serve as an important source of novel bioactive compounds for pharmaceutical research and drug development. Despite their immense potential, challenges such as habitat degradation, overharvesting, adulteration of herbal products, and erosion of indigenous knowledge threaten their sustainable utilization. Therefore, systematic documentation, conservation initiatives, cultivation practices, and evidence-based research are essential to preserve medicinal plant resources and maximize their contribution to human health and well-being.

7. Recent developments

Recent pharmacological studies further validate traditional practices. For instance, *W. somnifera* has been shown to possess significant anxiolytic, anti-inflammatory, and anticancer potential (Singh *et al.*, 2011). Similarly, *C. longa* has been extensively studied for its curcumin content, demonstrating potent antioxidant and anti-inflammatory properties with applications in metabolic and neurodegenerative disorders (Gupta *et al.*, 2022). Moreover, ethnobotanical reviews highlight that despite modern medical advances, reliance on plant-based remedies remains high in rural India, emphasizing the need for conservation and integration of traditional knowledge (Chaudhary *et al.*, 2023).

8. Conclusion

Medicinal plants of India embody centuries of ethnobotanical wisdom and remain indispensable to traditional and contemporary healthcare systems. Scientific validation has increasingly confirmed their antioxidant, antimicrobial, anti-inflammatory, and adaptogenic properties, reinforcing their relevance in modern medicine. Growing global interest in natural remedies, supported by WHO guidelines and advances in biotechnology, positions these plants as promising sources of novel therapeutics and wellness solutions. However, threats such as overexploitation, habitat loss, and climate change demand urgent conservation measures, including documentation of indigenous knowledge, establishment of gene banks, and community-led preservation initiatives. Standardization, quality control, and policy support are equally essential to strengthening India's standing in the global herbal medicine market. With strategic conservation, rigorous scientific research, and sustainable commercialization, India holds the potential to emerge as a world leader in medicinal plant-based healthcare and drug discovery.

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Conflict of interest

The authors declare no conflicts of interest relevant to this article.

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