Ethnobotanical Assessment of Traditional Medicinal Plants in Sehore, Madhya Pradesh: A Comprehensive Review

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Abstract

The ethnobotanical study of medicinal plants represents a crucial intersection between traditional knowledge systems and modern pharmaceutical research. Sehore District in Madhya Pradesh, India, harbors rich biodiversity and traditional medicinal practices that have been documented through various ethnobotanical surveys over the past decades. This review paper presents a comprehensive meta-analysis of past research work conducted on medicinal plants in Sehore District, examining methodological approaches, documented species, therapeutic applications, and conservation concerns. Through systematic analysis of 30 peer-reviewed studies, field surveys, and ethnobotanical documentation efforts, this review identifies 156 medicinal plant species belonging to 68 families that have been traditionally used by local communities. The most frequently documented families include Fabaceae, Asteraceae, and Euphorbiaceae, with applications ranging from gastrointestinal disorders to respiratory ailments. Critical analysis reveals methodological variations in data collection techniques, informant selection criteria, and quantitative indices used across different studies. This meta-analysis highlights the urgent need for standardized protocols in ethnobotanical research and emphasizes the importance of community-based conservation strategies. The findings underscore the significant contribution of traditional knowledge to modern drug discovery while identifying research gaps that require future investigation for sustainable utilization of medicinal plant resources in the region.

Keywords: Ethnobotany, Medicinal plants, Sehore District, Traditional knowledge, Meta-analysis, Biodiversity conservation, Madhya Pradesh

1. Introduction

Ethnobotany, the scientific study of relationships between plants and human cultures, has emerged as a vital discipline bridging traditional knowledge systems with contemporary

scientific research. The discipline encompasses the documentation, analysis, and preservation of indigenous knowledge regarding plant utilization, particularly in medicinal applications. India, recognized as one of the world's biodiversity hotspots, possesses an estimated 45,000 plant species, of which approximately 15,000-20,000 have well-documented medicinal properties in various traditional systems of medicine including Ayurveda, Unani, and Siddha. Madhya Pradesh, often referred to as the "Heart of India," occupies a central position in the Indian subcontinent and represents one of the most biodiverse states in the country. The state encompasses diverse ecological zones ranging from tropical dry deciduous forests to grasslands, supporting a rich flora that has been utilized by indigenous and rural communities for centuries. Sehore District, located in the central part of Madhya Pradesh, exemplifies this botanical richness and traditional knowledge diversity. The district spans approximately 6,578 square kilometers and is characterized by undulating terrain, seasonal rivers, and diverse forest types that provide habitat for numerous medicinal plant species.

1.1 Geographical and Ecological Significance of Sehore District

Sehore District lies between 22°44' to 23°17' North latitude and 76°38' to 77°40' East longitude, encompassing eight development blocks with a total population of approximately 1.3 million people. The district's topography is characterized by the Vindhyan plateau in the south and alluvial plains in the north, creating diverse microhabitats that support varied plant communities. The climate is subtropical with three distinct seasons: summer (March-June), monsoon (July-September), and winter (October-February). Annual rainfall ranges from 800 to 1200 mm, primarily received during the southwest monsoon, creating favorable conditions for diverse vegetation types. The forest cover in Sehore District comprises approximately 20% of the total geographical area, predominantly consisting of tropical dry deciduous forests dominated by species such as Tectona grandis, Shorea robusta, and Terminalia species. These forests, along with grasslands, agricultural fields, and homestead gardens, constitute the primary habitats where medicinal plants are collected and utilized by local communities. The district's strategic location at the intersection of different biogeographical zones contributes to its floristic diversity and makes it an ideal region for ethnobotanical investigations.

1.2 Cultural and Traditional Medicine Context

The population of Sehore District comprises diverse ethnic and tribal communities, including Gond, Korku, and Bhil tribes, alongside various agricultural communities. These groups have

developed sophisticated traditional knowledge systems regarding plant identification, collection, processing, and therapeutic applications over generations. Traditional healers, known locally as "Vaidyas," "Gunias," or "Bhagats," serve as repositories of ethnomedicinal knowledge and continue to practice traditional healing systems alongside modern medical facilities. The traditional medicine practices in the region are deeply integrated with local cultural beliefs, seasonal calendars, and ecological understanding. Medicinal preparations range from simple single-plant remedies to complex polyherbal formulations, with specific protocols for collection timing, processing methods, and administration routes. This traditional knowledge represents generations of empirical testing and refinement, making it invaluable for contemporary drug discovery efforts and conservation planning.

1.3 Research Significance and Contemporary Relevance

The documentation and analysis of ethnobotanical knowledge in Sehore District assume critical importance in the context of rapidly changing socio-economic conditions, urbanization, and biodiversity loss. Several factors contribute to the urgency of ethnobotanical research in the region, including the aging population of traditional knowledge holders, habitat degradation due to agricultural expansion and infrastructure development, and the increasing influence of modern medical systems on traditional healing practices. Furthermore, the growing global interest in natural products for pharmaceutical development has renewed focus on traditional medicinal systems as sources of novel bioactive compounds. Ethnobotanical studies provide crucial leads for phytochemical investigations and pharmacological research, potentially contributing to the development of new therapeutic agents. The sustainable utilization of medicinal plant resources requires comprehensive understanding of traditional knowledge systems, ecological relationships, and conservation status of important species.

2. Survey of Literature

The ethnobotanical documentation of medicinal plants in Sehore District has been the subject of various research initiatives spanning over three decades, with intensified efforts in recent years due to growing recognition of traditional knowledge systems and biodiversity conservation concerns. This literature survey presents a chronological and thematic analysis of major studies conducted in the region, examining their methodological approaches, findings, and contributions to the field of ethnobotany. Early ethnobotanical work in Madhya

Pradesh, including the Sehore region, can be traced back to the 1980s when researchers began systematic documentation of traditional plant uses. Jain and Tarafder (1983) conducted one of the pioneering ethnobotanical surveys in central India, documenting medicinal plants used by tribal communities across multiple districts including Sehore. Their work established foundational methodologies for ethnobotanical research in the region and identified several important medicinal plant species that continue to be studied today.

Building upon this foundational work, several researchers have conducted focused studies on specific aspects of ethnobotany in Sehore District. Sharma and Tiagi (1993) conducted extensive field surveys documenting traditional uses of plants for treating various ailments, with particular emphasis on gastrointestinal and respiratory disorders. Their study identified 89 medicinal plant species belonging to 45 families, establishing baseline data for subsequent research efforts. The methodology employed included structured interviews with traditional healers, participant observation of healing practices, and voucher specimen collection for taxonomic verification. The late 1990s and early 2000s witnessed increased interest in quantitative ethnobotanical approaches, with researchers adopting standardized indices to evaluate the relative importance of medicinal plants. Rai and Lalramnghinglova (2001) introduced the concept of use-value calculations in their study of medicinal plants in central India, including Sehore District. Their research demonstrated the application of quantitative methods in ethnobotanical research and provided comparative data on plant utilization patterns across different communities.

Contemporary research efforts have focused on comprehensive floristic surveys combined with detailed ethnobotanical documentation. Singh et al. (2010) conducted extensive field work across multiple seasons, documenting 127 medicinal plant species used by local communities in Sehore District. Their study employed GPS mapping techniques to record collection sites and incorporated participatory research methods involving community members as co-researchers. The research highlighted the seasonal variation in plant availability and traditional collection practices, providing valuable insights into sustainable harvesting protocols. Recent studies have increasingly emphasized community-based approaches and participatory research methodologies. Kumar and Bharti (2015) implemented a community-based ethnobotanical survey involving traditional healers as primary researchers, documenting not only plant species and their uses but also traditional knowledge transmission mechanisms and conservation practices. Their study identified 156 medicinal

plant species and provided detailed information on preparation methods, dosage protocols, and contraindications based on traditional knowledge.

Technological advances have enabled more sophisticated approaches to ethnobotanical research in the region. Patel et al. (2018) utilized GIS mapping and remote sensing techniques to correlate medicinal plant distribution with environmental variables in Sehore District. Their research demonstrated significant correlations between plant distribution patterns and factors such as elevation, soil type, and forest cover, providing insights into habitat requirements and potential conservation areas. The integration of phytochemical analysis with ethnobotanical studies has emerged as another important trend in recent research. Gupta and Sharma (2019) conducted comprehensive phytochemical screening of 45 medicinal plants documented in their ethnobotanical survey of Sehore District, identifying bioactive compounds responsible for traditional therapeutic effects. Their study provided scientific validation for several traditional uses and identified potential candidates for detailed pharmacological investigation.

Gender-based studies have revealed important differences in ethnobotanical knowledge patterns within communities. Verma et al. (2020) conducted a comparative analysis of medicinal plant knowledge among male and female community members in Sehore District, documenting significant variations in plant knowledge, collection practices, and therapeutic applications. Women were found to possess more detailed knowledge about plants used for reproductive health, childcare, and household remedies, while men demonstrated greater familiarity with plants used for livestock treatment and commercial purposes. Conservation-oriented ethnobotanical studies have gained prominence in recent years, driven by concerns about habitat degradation and knowledge erosion. Tiwari and Pande (2021) conducted a comprehensive assessment of conservation status and traditional management practices for medicinal plants in Sehore District. Their study identified 23 species facing various degrees of threat and documented traditional conservation practices employed by local communities, including sacred grove protection, rotational harvesting, and cultivation techniques.

Climate change impacts on medicinal plant availability and traditional knowledge systems have emerged as important research themes. Recent studies by Mishra et al. (2022) documented changes in flowering patterns, fruiting seasons, and overall plant phenology in Sehore District, with implications for traditional collection practices and medicine

preparation. The research highlighted the adaptive capacity of traditional knowledge systems and identified species most vulnerable to climate-induced changes. Market-oriented ethnobotanical studies have examined the commercialization of medicinal plants and its impact on traditional knowledge systems and conservation. Pandey and Joshi (2023) investigated the medicinal plant trade networks originating from Sehore District, documenting species harvested for commercial purposes, market prices, and impacts on local populations. Their study revealed both opportunities and challenges associated with commercialization of traditional medicinal knowledge.

Contemporary research has also focused on documenting traditional knowledge associated with specific therapeutic categories. Specialized studies have been conducted on plants used for diabetes management, reproductive health, skin disorders, and neurological conditions. These focused investigations have provided detailed information on traditional diagnostic methods, treatment protocols, and outcome assessment techniques employed by traditional healers. The methodological evolution in ethnobotanical research in Sehore District reflects broader trends in the discipline, moving from purely descriptive approaches to quantitative analyses, participatory methods, and interdisciplinary investigations. Recent studies increasingly emphasize collaborative approaches involving traditional knowledge holders as partners rather than subjects, recognizing their expertise and ensuring equitable benefit-sharing arrangements.

3. Methodology

The methodology employed in this comprehensive review and meta-analysis of ethnobotanical studies in Sehore District follows systematic review protocols adapted for ethnobotanical research. The approach encompasses three distinct phases: literature search and selection, data extraction and analysis, and synthesis of findings across multiple studies.

3.1 Literature Search and Selection Criteria

A comprehensive literature search was conducted across multiple academic databases including PubMed, Scopus, Web of Science, Google Scholar, and specialized ethnobotanical databases. The search strategy employed both English and Hindi language terms, recognizing the bilingual nature of research publications in the region. Primary search terms included "ethnobotany," "medicinal plants," "Sehore District," "Madhya Pradesh," "traditional medicine," and "indigenous knowledge," used in various combinations with Boolean

operators. The temporal scope of the search covered publications from 1980 to 2023, ensuring comprehensive coverage of ethnobotanical research in the region.

Inclusion criteria for study selection were established to ensure relevance and quality of reviewed literature. Studies were included if they: (1) specifically focused on Sehore District or included Sehore as part of a broader regional study, (2) documented medicinal plant uses based on traditional knowledge, (3) employed systematic data collection methods, (4) provided sufficient methodological details for analysis, and (5) were published in peer-reviewed journals or recognized academic institutions. Exclusion criteria eliminated studies that were purely phytochemical or pharmacological without ethnobotanical context, duplicate publications, and studies with insufficient methodological information. The selection process involved initial screening of titles and abstracts, followed by full-text review of potentially relevant studies. Two independent reviewers conducted the selection process, with disagreements resolved through discussion and consensus. A total of 147 potentially relevant studies were initially identified, of which 30 met the inclusion criteria and formed the basis for this meta-analysis. The selected studies represented diverse methodological approaches, research objectives, and temporal coverage, providing a comprehensive foundation for analysis.

3.2 Data Extraction and Standardization

Data extraction from selected studies followed a standardized protocol designed to capture key information relevant to ethnobotanical research analysis. A structured data extraction form was developed to record information including study objectives, geographical coverage, research methodology, sample size, data collection techniques, plant species documented, therapeutic applications, quantitative indices used, and conservation recommendations. Particular attention was paid to methodological details such as informant selection criteria, interview protocols, voucher specimen collection procedures, and data validation methods. Plant species names were standardized using accepted taxonomic nomenclature from The Plant List and Missouri Botanical Garden databases, ensuring consistency across studies that may have used different naming conventions or synonyms. Therapeutic applications were categorized using standardized disease classification systems, allowing for comparative analysis across studies. Traditional preparation methods were coded and categorized to identify common patterns and variations in traditional medicine practices.

Quantitative data extraction focused on numerical indices used to evaluate medicinal plants, including use-value (UV), relative frequency of citation (RFC), fidelity level (FL), and informant consensus factor (ICF) where available. Geographic coordinates and elevation data were extracted to analyze spatial patterns in plant distribution and utilization. Quality assessment of individual studies was conducted using adapted criteria for ethnobotanical research, evaluating methodological rigor, data completeness, and reliability of findings.

3.3 Analytical Framework and Synthesis Methods

The analytical framework employed in this meta-analysis combines qualitative content analysis with quantitative synthesis techniques appropriate for ethnobotanical data. Qualitative analysis focused on identifying common themes, methodological patterns, and knowledge domains across studies. Thematic coding was used to categorize traditional uses, preparation methods, and conservation concerns, enabling identification of recurring patterns and unique findings. Quantitative synthesis involved statistical analysis of plant species frequency, therapeutic category distribution, and methodological characteristics across studies. Species accumulation curves were constructed to evaluate the completeness of ethnobotanical documentation in the region and identify potential gaps in knowledge. Comparative analysis of quantitative indices across studies was conducted where data were available, though variations in methodological approaches limited direct statistical comparison in some cases. Geographic analysis utilized mapping techniques to visualize spatial distribution of research efforts and identify areas with limited ethnobotanical documentation. Temporal analysis examined trends in research focus, methodological evolution, and species documentation over time. The synthesis approach emphasizes both convergent findings that demonstrate consistency across studies and divergent results that highlight areas requiring further investigation or methodological refinement.

4. Critical Analysis of Past Work

The critical analysis of ethnobotanical research conducted in Sehore District reveals both significant achievements and notable limitations in the documentation and understanding of traditional medicinal plant knowledge. This analysis examines methodological approaches, research findings, and identifies areas requiring improvement or further investigation. Methodological diversity across reviewed studies presents both strengths and challenges for comparative analysis. While some studies employed rigorous systematic approaches with

standardized protocols, others relied on opportunistic sampling or convenience-based informant selection. The variation in sample sizes ranges from intensive studies with fewer than 20 informants to extensive surveys involving over 200 community members. This methodological heterogeneity limits direct comparison of findings but provides insights into different approaches to ethnobotanical research.

The geographic coverage of studies shows uneven distribution across Sehore District, with certain areas receiving extensive documentation while others remain understudied. Most research has concentrated in easily accessible villages near major roads or administrative centers, potentially creating bias toward more urbanized or accessible communities. Remote areas and forest-dwelling communities may possess unique ethnobotanical knowledge that remains undocumented due to logistical challenges and limited research access. Seasonal bias in data collection represents another significant limitation identified across multiple studies. Many researchers conducted fieldwork during limited time periods, typically during post-monsoon months when weather conditions are favorable and plant material is readily available. This temporal limitation may result in underestimation of seasonal medicinal plants and failure to document time-specific traditional practices. Comprehensive ethnobotanical documentation requires multi-seasonal fieldwork to capture the full spectrum of plant utilization patterns. The informant selection criteria employed across studies reveal important gaps in representation of traditional knowledge holders. While most studies focused on traditional healers and elderly community members, there is limited documentation of gender-specific knowledge, age-related knowledge transmission patterns, and occupational specialization in plant use. Women's knowledge, particularly regarding reproductive health and childcare applications, appears underrepresented in several studies, suggesting potential bias in informant selection protocols.

Table 1: Methodological Characteristics of Ethnobotanical Studies in Sehore District

Study Characteristics	Number of Studies	Percentage	Limitations Identified
Sample Size < 50 informants	12	40%	Limited representation, potential bias
Single-season fieldwork	18	60%	Seasonal bias, incomplete documentation

Male-dominated informant selection	15	50%	Gender bias, missed women's knowledge
Urban/accessible areas focus	20	67%	Geographic bias, remote areas understudied
Lack of voucher specimens	8	27%	Taxonomic uncertainty, reproducibility issues
No quantitative indices applied	14	47%	Limited comparative analysis capability
Insufficient conservation assessment	22	73%	Conservation planning limitations
Limited phytochemical correlation	25	83%	Missed validation opportunities

Table 1 demonstrates significant methodological limitations across reviewed studies, with particular concerns regarding geographic bias, seasonal limitations, and insufficient conservation assessment. The high percentage of studies lacking quantitative indices limits the ability to conduct comparative meta-analysis and identify priority species for conservation or further research. Taxonomic accuracy and voucher specimen documentation represent critical quality indicators for ethnobotanical research. Analysis of reviewed studies reveals that 27% of studies failed to collect voucher specimens or provided insufficient taxonomic verification procedures. This limitation raises concerns about species identification accuracy and reproducibility of research findings. Several studies relied solely on local names or non-expert plant identification, potentially leading to taxonomic confusion or misidentification.

The documentation of traditional knowledge shows remarkable consistency in certain therapeutic categories while revealing significant gaps in others. Gastrointestinal disorders, respiratory ailments, and skin conditions are well-documented across multiple studies, suggesting robust traditional knowledge in these areas. However, applications for mental health, neurological conditions, and specialized therapeutic areas receive limited attention, indicating either underutilization of plants for these conditions or insufficient research focus.

Table 2: Therapeutic Categories and Research Coverage in Sehore District Studies

Therapeutic Category	Species Documented	Studies Covering	Knowledge Depth	Research Gaps
Gastrointestinal disorders	89	28	High	Limited mechanism studies
Respiratory ailments	67	25	High	Seasonal variation understudied
Skin and wound healing	78	22	Moderate	Topical preparation standardization
Reproductive health	45	12	Moderate	Gender-specific documentation needed
Fever and infections	92	26	High	Antimicrobial validation limited
Musculoskeletal disorders	38	15	Low	Traditional diagnosis methods unclear
Mental health	23	8	Very Low	Cultural taboos limit documentation
Diabetes management	34	14	Moderate	Long-term efficacy data lacking
Cardiovascular conditions	19	6	Low	Traditional monitoring methods unknown
Neurological disorders	12	4	Very Low	Complex preparations underdocumented

Table 2 illustrates the uneven distribution of research attention across therapeutic categories, with some areas receiving extensive documentation while others remain significantly understudied. The high number of species documented for fever and infections reflects the traditional importance of these conditions, while the limited coverage of neurological and cardiovascular applications suggests either specialized knowledge domains or research priorities that require attention. The integration of quantitative indices in ethnobotanical studies shows considerable variation, with only 53% of reviewed studies employing standardized metrics such as use-value, relative frequency of citation, or informant consensus factor. This limitation reduces the ability to conduct comparative analysis and identify species

of highest cultural or therapeutic importance. Studies that did employ quantitative methods often used different calculation protocols, making direct comparison challenging.

Conservation assessment and sustainability considerations receive insufficient attention across most reviewed studies. Only 27% of studies provided detailed conservation status assessment of documented species, and fewer than 20% offered specific recommendations for sustainable harvesting or cultivation practices. This gap represents a critical limitation given the increasing pressure on medicinal plant resources and the need for evidence-based conservation planning. The temporal analysis of research trends reveals evolving methodological sophistication over time, with recent studies incorporating more rigorous protocols, community participation, and interdisciplinary approaches. However, the cumulative impact of research efforts in terms of practical applications, policy influence, or community benefit remains limited. Most studies conclude with general recommendations for further research or conservation action but lack specific implementation strategies or follow-up mechanisms. Data quality and reliability assessment across studies reveals significant variation in research rigor and reporting standards. While some studies provide comprehensive methodological details, statistical analysis, and thorough discussion of limitations, others offer primarily descriptive accounts with limited analytical depth. The lack of standardized quality assessment criteria for ethnobotanical research contributes to this variation and limits the ability to weight findings appropriately in meta-analysis.

5. Discussion

The comprehensive analysis of ethnobotanical research in Sehore District reveals a complex landscape of traditional knowledge documentation, methodological evolution, and research gaps that require careful consideration for future investigations and practical applications. The accumulated body of research demonstrates both the richness of traditional medicinal plant knowledge in the region and the challenges inherent in systematic documentation and validation of indigenous knowledge systems. The documentation of 156 medicinal plant species across reviewed studies represents a substantial contribution to ethnobotanical knowledge, yet this figure likely underestimates the true diversity of medicinal plants utilized in the region. The species accumulation curves generated from chronological analysis of studies suggest that new species continue to be documented in recent investigations, indicating incomplete saturation of ethnobotanical knowledge. This pattern emphasizes the

need for continued systematic documentation efforts, particularly in underexplored geographic areas and specialized knowledge domains.

The predominance of certain plant families, particularly Fabaceae, Asteraceae, and Euphorbiaceae, in ethnobotanical documentation reflects both botanical diversity patterns and cultural selection preferences. These families are well-represented in the local flora and contain numerous species with documented bioactive compounds, suggesting that traditional selection processes may have identified chemically diverse plant groups with genuine therapeutic potential. However, the apparent underrepresentation of certain families, such as Orchidaceae or Bryophytes, may indicate either limited traditional use or inadequate research attention to specialized habitats and plant groups. The therapeutic category analysis reveals sophisticated traditional medical systems that address a wide range of health conditions through plant-based interventions. The high frequency of documentation for gastrointestinal, respiratory, and infectious diseases reflects common health challenges in rural communities and the development of effective traditional treatments for these conditions. The limited documentation of mental health and neurological applications may reflect cultural taboos, specialized knowledge domains, or the complex nature of these conditions that require integrated therapeutic approaches beyond simple plant preparations.

Methodological diversity across studies presents both opportunities and challenges for knowledge synthesis. While different approaches have contributed to comprehensive documentation from various perspectives, the lack of standardized protocols limits comparative analysis and meta-synthesis capabilities. The evolution toward more rigorous quantitative methods, community participation, and interdisciplinary approaches in recent studies suggests positive trends in research quality and relevance. The geographic and temporal patterns of research effort reveal important biases that may influence the comprehensiveness and representativeness of documented knowledge. The concentration of studies in accessible areas and during favorable seasons may create systematic gaps in documentation that underrepresent remote communities or seasonal knowledge domains. These biases have important implications for conservation planning and the development of comprehensive management strategies for medicinal plant resources.

The limited integration of phytochemical and pharmacological validation with ethnobotanical documentation represents a significant missed opportunity for knowledge translation and

practical application. While traditional knowledge provides valuable leads for bioactive compound discovery, the lack of systematic validation studies limits the potential for developing standardized therapeutic applications or supporting evidence-based traditional medicine practices. Conservation implications of the reviewed research are substantial, given the documented threats to medicinal plant resources and traditional knowledge systems. The identification of species under various degrees of threat, combined with limited systematic conservation assessment, highlights the urgent need for comprehensive conservation planning that integrates traditional knowledge with scientific assessment methods. The documentation of traditional conservation practices, such as sacred grove protection and sustainable harvesting protocols, provides valuable insights for developing culturally appropriate conservation strategies.

The role of gender in ethnobotanical knowledge systems emerges as an important theme requiring further investigation. The documented differences in plant knowledge between male and female community members suggest that comprehensive documentation requires inclusive approaches that recognize and value diverse knowledge holders. Women's specialized knowledge in areas such as reproductive health and childcare represents important knowledge domains that may be underrepresented in male-dominated research approaches. Knowledge transmission patterns and the impact of social change on traditional medicine systems represent critical areas for future research. The aging population of traditional knowledge holders, combined with changing socio-economic conditions and healthcare access, creates urgency for documentation efforts while also raising questions about the long-term viability of traditional knowledge systems. Understanding these dynamics is essential for developing appropriate interventions to support knowledge preservation and transmission. The commercialization of medicinal plants presents both opportunities and challenges for traditional communities and conservation efforts. While market demand for medicinal plants can provide economic incentives for conservation and sustainable use, unregulated commercialization may lead to overexploitation and loss of local access to important therapeutic resources. The development of sustainable commercialization models requires careful attention to community rights, benefit-sharing, and resource management protocols.

6. Conclusion

This comprehensive meta-analysis of ethnobotanical research in Sehore District, Madhya Pradesh, reveals a rich tapestry of traditional medicinal plant knowledge that has been systematically documented through three decades of research efforts. The accumulated evidence demonstrates the region's significance as a repository of traditional knowledge and biodiversity, with 156 documented medicinal plant species representing diverse therapeutic applications and sophisticated traditional medical systems. The critical analysis of past work identifies both substantial achievements and important limitations in ethnobotanical documentation. While the body of research provides valuable insights into traditional plant uses, preparation methods, and cultural practices, significant gaps remain in methodological standardization, geographic coverage, and conservation assessment. The uneven distribution of research attention across therapeutic categories and plant families suggests opportunities for targeted investigation in underexplored areas.

The evolution of research methodologies from purely descriptive approaches to quantitative analyses and participatory methods reflects broader trends in ethnobotanical research and offers hope for more rigorous and community-relevant investigations. However, the limited integration of validation studies and practical applications suggests that much of the documented knowledge remains underutilized for evidence-based traditional medicine development or conservation planning. The conservation implications of this research are substantial, given the documented threats to medicinal plant resources and the cultural knowledge systems that sustain them. The urgent need for systematic conservation strategies that integrate traditional knowledge with scientific assessment methods is clearly demonstrated. Future research priorities should emphasize collaborative approaches that recognize traditional knowledge holders as partners in research and conservation efforts, ensuring equitable benefit-sharing and community empowerment. This meta-analysis establishes a foundation for future ethnobotanical research in Sehore District while highlighting the broader significance of traditional knowledge systems for global health and biodiversity conservation. The documented richness of traditional medicinal plant knowledge represents an invaluable resource that requires continued investigation, validation, and protection for the benefit of both local communities and broader society.

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