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EXPLORING MEDICINAL TREE RESOURCES OF ACHANAKMAR–AMARKANTAK BIOSPHERE RESERVE, CHHATTISGARH: A REVIEW

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Abstract:

Medicinal plants constitute an integral component of traditional healthcare systems and continue to play a vital role in meeting the primary healthcare needs of indigenous communities. The Achanakmar–Amarkantak Biosphere Reserve (AABR), located in Central India across Chhattisgarh and Madhya Pradesh, is a biodiversity-rich landscape supporting diverse tribal populations with extensive ethnomedicinal knowledge. The present study compiles and analyzes medicinally important tree species reported from the transition and buffer zones of the biosphere reserve, emphasizing their taxonomic diversity, plant parts utilized, and therapeutic applications. Ethnobotanical records indicate that tree species provide bark, leaves, fruits, flowers, seeds, latex, gums, and resins used in treating gastrointestinal disorders, respiratory ailments, skin diseases, diabetes, fever, inflammation, and musculoskeletal conditions. The study highlights the significant role of indigenous knowledge in healthcare and underscores the importance of conserving medicinal tree resources. The compiled information provides a valuable baseline for future pharmacological research, biodiversity conservation, and sustainable utilization of medicinal plant diversity.

Keywords: *Medicinal Plants, Ethnobotany, Tree Species, Indigenous Knowledge, Achanakmar–Amarkantak Biosphere Reserve, Biodiversity Conservation.*

Introduction

Medicinal plants have served as the foundation of traditional healthcare systems since ancient times and continue to provide primary healthcare support to nearly 80% of the population in many developing countries (1). India is recognized as one of the world's biodiversity-rich nations and possesses a vast repository of traditional knowledge associated with medicinal plants. Indigenous communities inhabiting forest ecosystems have developed extensive ethnomedicinal practices based on locally available plant resources (2,3). The Achanakmar–Amarkantak Biosphere Reserve (AABR), situated in the states of Chhattisgarh and Madhya Pradesh, represents one of the most important biodiversity hotspots of Central India. The biosphere reserve covers approximately 3,835 km^2 and

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encompasses tropical moist and dry deciduous forests that support rich floral diversity and numerous tribal communities including Baiga, Gond, Oraon, Panika, Kol, and Pradhan (4,5). These indigenous communities depend heavily on forest resources for food, medicine, shelter, and livelihood.

Ethnobotanical investigations conducted in the biosphere reserve have revealed that medicinal plants constitute an essential component of traditional healthcare practices among tribal populations. Several studies have documented the use of diverse plant species for the treatment of gastrointestinal disorders, respiratory ailments, skin diseases, diabetes, fever, inflammation, and musculoskeletal disorders (6,7,8). Among various life forms, tree species occupy a significant position because they provide multiple medicinally important plant parts such as bark, leaves, fruits, flowers, seeds, latex, gum, and resin, which are utilized either singly or in combination for therapeutic purposes (4,5).

Despite several ethnobotanical surveys in the Achanakmar–Amarkantak Biosphere Reserve, information specifically focused on medicinally important tree species occurring in the transition and buffer zones remains fragmented. Therefore, the present study was undertaken to compile and analyze medicinally important tree species reported from the transition and buffer zones of AABR, with emphasis on taxonomic diversity, plant parts utilized, and major therapeutic applications. The study aims to contribute towards the documentation of indigenous knowledge systems and provide baseline information for future conservation and sustainable management of medicinal tree resources in the biosphere reserve.

Methodology

The study focuses on the transition and buffer zones of the Achanakmar–Amarkantak Biosphere Reserve (AABR), located between the states of Chhattisgarh and Madhya Pradesh, India.

Data collection

The present study was based on a comprehensive review of published ethnobotanical literature related to medicinal plants of the Achanakmar–Amarkantak Biosphere Reserve. Relevant information was collected from peer-reviewed research articles, scientific reports, thesis, conference proceedings, different volumes of Biosphere Reserve Information series published by Tropical Forest Research Institute M.P. and ethnobotanical surveys published between 1990 and 2024.

Literature sources were identified through academic databases including Google Scholar, Scopus, Web of Science, Research Gate, and institutional repositories using keywords such as "Achanakmar–Amarkantak Biosphere Reserve", "ethnobotany", "medicinal plants", "tribal medicine", "Baiga tribe", and "traditional knowledge".

Selection criteria

Only tree species satisfying the following criteria were included in the analysis:

- Reported from the transition or buffer zones of AABR.
- Identified up to species level.
- Documented medicinal use by local tribal communities.
- Supported by published ethnobotanical literature.

Ethical considerations

The study was entirely based on published literature and did not involve direct interviews, collection of personal information, or field experimentation involving human participants. All ethnobotanical information was appropriately acknowledged through citation of original sources.

Diversity of medicinal tree species

A total of 20 medicinally important tree species belonging to 14 families were reported from the transition and buffer zones of the Achanakmar–Amarkantak Biosphere Reserve (AABR) from different research and review studied, listed in Table 1. The recorded species were traditionally utilized by indigenous communities for the treatment of various ailments including digestive disorders, respiratory diseases, skin infections, diabetes, fever, inflammation, and musculoskeletal disorders. The documented medicinal flora comprised economically and therapeutically important species such as *Shorea robusta, Terminalia chebula, Terminalia bellirica, Phyllanthus emblica, Madhuca longifolia, Pterocarpus marsupium, Syzygium cumini,* and *Azadirachta indica*.

Table 1: Ethnomedicinal use of different tree species from transition and buffer zone of AABR

S. No.	Scientific Name	Family	Plant Part Used	Ethnomedicinal Use	Citation Source
1	*Shorea robusta*	Dipterocarpaceae	Resin, bark	Wounds, skin diseases	Singh *et al.* (4); Swamy *et al.* (5)
2	*Terminalia chebula*	Combretaceae	Fruit	Digestive disorders, constipation, cough	Tiwari *et al.* (6); Swamy *et al.* (5)
3	*Terminalia bellirica*	Combretaceae	Fruit	Cough, bronchitis, diarrhea	Tiwari *et al.* (6); Shukla *et al.* (7)
4	*Phyllanthus emblica*	Phyllanthaceae	Fruit	General tonic, immunity, stomach ailments	Singh *et al.* (4); Swamy *et al.* (5)
5	*Madhuca longifolia*	Sapotaceae	Flowers, bark	Rheumatism, cough, skin disorders	Kapale (9); Swamy *et al.* (5)
6	*Pterocarpus marsupium*	Fabaceae	Bark, heartwood	Diabetes, inflammation	Baghel *et al.* (10); Tiwari *et al.* (6)
7	*Syzygium cumini*	Myrtaceae	Seeds, bark	Diabetes, dysentery	Baghel *et al.* (10); Singh *et al.* (4)
8	*Buchanania lanzan*	Anacardiaceae	Bark, seed	Wounds, digestive complaints	Singh *et al.* (4); Swamy *et al.* (5)
9	*Boswellia serrata*	Burseraceae	Resin	Arthritis, joint pain	Ahirwar & Sandya (8)
10	*Aegle marmelos*	Rutaceae	Fruit, leaves	Dysentery, diarrhea	Tiwari *et al.* (6); Swamy *et al.* (5)
11	*Azadirachta indica*	Meliaceae	Leaves, bark	Skin diseases, fever	Shukla *et al.* (7); Swamy *et al.* (5)
12	*Ficus religiosa*	Moraceae	Bark, leaves	Asthma, ulcers	Shrivastava & Mishra (11); Singh *et al.* (4)

13	*Ficus benghalensis*	Moraceae	Bark, latex	Diabetes, dysentery	Baghel *et al.* (10); Swamy *et al.* (5)
14	*Ficus racemosa*	Moraceae	Bark, fruit	Diarrhea, wound healing	Tiwari *et al.* (6)
15	*Anogeissus latifolia*	Combretaceae	Bark	Fever, skin ailments	Singh *et al.* (4)
16	*Haldina cordifolia*	Rubiaceae	Bark	Fever, liver disorders	Swamy *et al.* (5)
17	*Mitragyna parvifolia*	Rubiaceae	Bark	Bone fracture, fever	Tiwari *et al.* (6)
18	*Schleichera oleosa*	Sapindaceae	Bark, seed oil	Skin infections, wounds	Singh *et al.* (4)
19	*Diospyros melanoxylon*	Ebenaceae	Bark, fruit	Dysentery, wound healing	Kapale (9); Swamy *et al.* (5)
20	*Butea monosperma*	Fabaceae	Flowers, gum	Diarrhea, intestinal worms	Tiwari *et al.* (6); Swamy *et al.* (5)

Family-wise distribution

Table 2: Percentage of Family contribution no. of species for ethnomedicinal purpose

S. No.	Family	No. of Species	Species Name	Percentage of Family Contribution
1	Combretaceae	3	*Terminalia chebula, T. bellirica, Anogeissus latifolia*	21.4 %
2	Moraceae	3	*Ficus religiosa, F. benghalensis, F. racemosa*	21.4 %
3	Fabaceae	2	*Pterocarpus marsupium, Butea monosperma*	14.2 %
4	Rubiaceae	2	*Haldina cordifolia, Mitragyna parvifolia*	14.2 %
5	Sapotaceae	1	*Madhuca longifolia*	7.1 %
6	Sapindaceae	1	*Schleichera oleosa*	7.1 %
7	Dipterocarpaceae	1	*Shorea robusta*	7.1 %
8	Phyllanthaceae	1	*Phyllanthus emblica*	7.1 %
9	Myrtaceae	1	*Syzygium cumini*	7.1 %
10	Anacardiaceae	1	*Buchanania lanzan*	7.1 %
11	Burseraceae	1	*Boswellia serrata*	7.1 %
12	Rutaceae	1	*Aegle marmelos*	7.1 %
13	Meliaceae	1	*Azadirachta indica*	7.1 %
14	Ebenaceae	1	*Diospyros melanoxylon*	7.1 %

A total of 14 plant families listed in table 2 and represented by Fig 1, were represented by the 20 medicinal tree species documented in the study. The family Combretaceae was the most dominant (21.4 %), contributing 3 species (*Terminalia chebula, T. bellirica*, and *Anogeissus latifolia*). Similarly, the family Moraceae was represented by 3 species (*Ficus religiosa, F. benghalensis*, and *F. racemosa*) contributin 21.4 % of total families. The families Fabaceae and Rubiaceae contributed 2 species each with 14.2 %, while the remaining families were represented by a single species with 7.1 %.

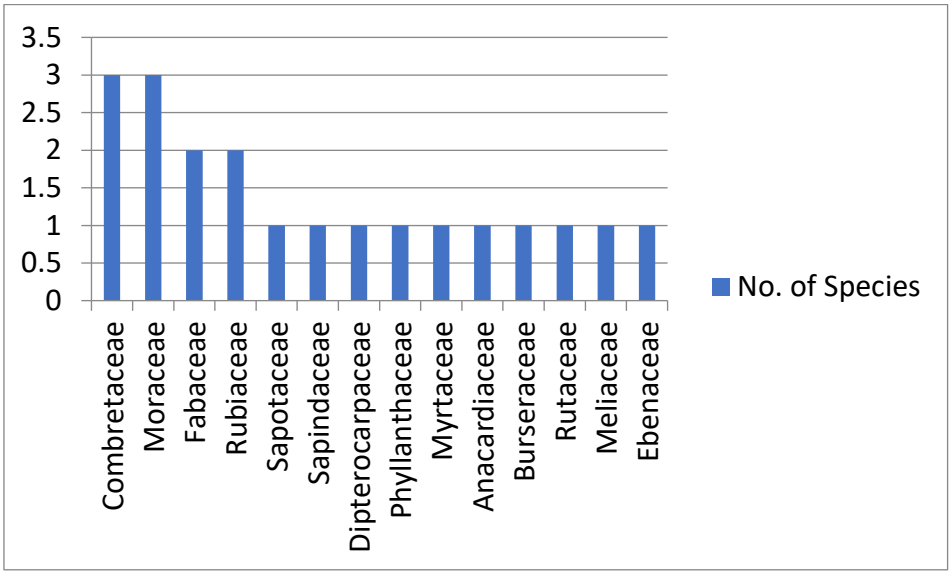

Figure 1: Family-wise distribution of medicinal tree species

Plant Parts Used in Traditional Medicine

Analysis of plant parts used revealed that bark was the most frequently utilized plant part. Out of the 20 documented species, bark was reported from 14 species (70%), followed by fruits used in 6 species (30%). Leaves were utilized in 3 species (15%), while seeds, flowers, gum, resin, latex, and seed oil were comparatively less frequently used. Table 3 and Fig 2 represent the useful parts of tree species. The extensive use of bark suggests its perceived therapeutic efficacy among local healers; however, excessive bark harvesting may adversely affect tree health and regeneration.

Table 3: Analysis of plant part uses.

S. No.	Plant Part	Number of Species	Percentage (%)
1	Bark	14	70.0
2	Fruit	6	40.0
3	Leaves	3	20.0
4	Seeds	2	15.0
5	Flowers	2	10.0
6	Resin	2	10.0
7	Gum	1	5.0
8	Latex	1	5.0
9	Heartwood	1	5.0

Therapeutic applications

The medicinal tree species documented in the present study were used for the treatment of a wide range of ailments categorized in almost 13 categories. Digestive disorders constituted the largest therapeutic category, followed by skin diseases, respiratory disorders, diabetes, arthritis, fever etc.

Gastrointestinal disorders constituted the most frequently treated disease category. Approximately 10 species were reported for the treatment of diarrhea, dysentery, digestive disorders, constipation, and stomach ailments. Important species in this category included *Terminalia chebula*, *Terminalia bellirica*, *Aegle marmelos*, *Cassia fistula*, *Ficus racemosa*, and *Syzygium cumini*. This contributes about 50 % of the total species found.

Approximately 7 species were reported contributing 35% of the total species for the management of skin diseases and wound healing. Notable examples included *Shorea robusta*, *Azadirachta indica*, *Schleichera oleosa*, *Buchanania lanzan*, and *Diospyros melanoxylon*. These species are commonly utilized in traditional formulations because of their antimicrobial and anti-inflammatory properties.

Respiratory disorders represented another major therapeutic category, with approximately 4 species (20%) such as *Terminalia bellirica*, *Madhuca longifolia*, *Albizia lebbeck*, *Ficus religiosa*, and *Oroxylum indicum* being used for the treatment of cough, asthma, bronchitis, and other respiratory ailments.

Diabetes management was another important use category. 3 major species, namely *Pterocarpus marsupium*, *Syzygium cumini*, and *Ficus benghalensis* represented by 15% of the total species found, were frequently cited by tribal communities for controlling blood glucose levels. The occurrence of multiple antidiabetic species highlights the rich ethnopharmacological knowledge associated with the biosphere reserve.

Fever and inflammatory conditions were treated using several medicinal tree species including *Anogeissus latifolia*, *Haldina cordifolia*, *Mitragyna parvifolia*, *Boswellia serrata*, and *Neolamarckia cadamba*. The resin of *Boswellia serrata* was particularly valued for the treatment of arthritis and joint pain, while *Mitragyna parvifolia* and *Lannea coromandelica* were used in traditional bone fracture healing practices.

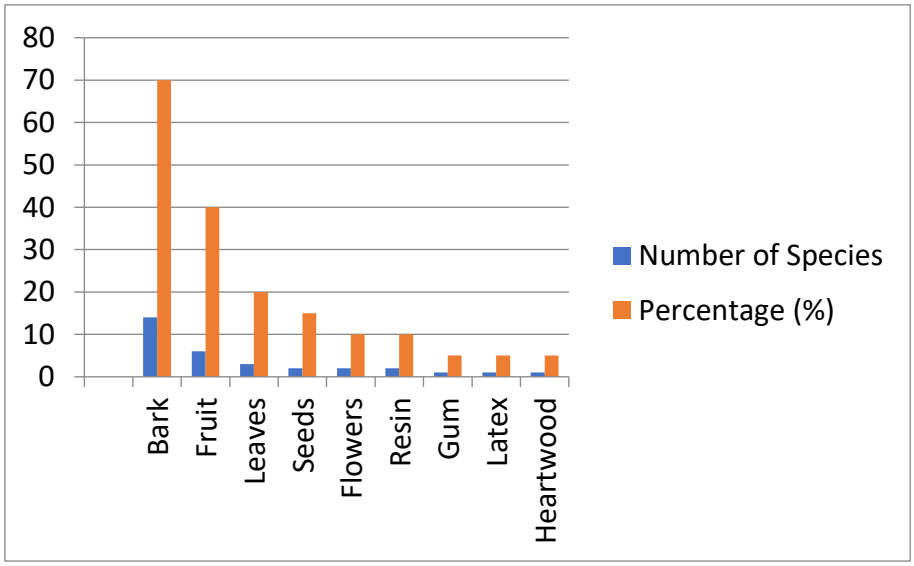

Figure 2: Plant parts utilized for medicinal purposes

Table 4: Disease wise Distribution of Medicinal Uses

S. No.	Disease Category	Species Used	Approximate No. of Species	Species Percentage
1	Gastro intestinal disorders	*Terminalia chebula, Terminalia bellirica, Syzygium cumini, Buchanania lanzan , Aegle marmelos, Ficus benghalensis, Diospyros melanoxylon, Butea monosperma, Ficus racemosa, Phyllanthus emblica,*	10	50 %
2	Skin disease and wound healing	*Shorea robusta, Madhuca longifolia, Buchanania lanzan, Ficus racemosa, Anogeissus latifolia, Schleichera oleosa, Diospyros melanoxylon,*	7	35 %
3	Respiratory Disease	*Terminalia chebula, Terminalia bellirica, Madhuca longifolia, Ficus religiosa,*	4	20 %
4	Fever	*Azadirachta indica, Anogeissus latifolia, Haldina cordifolia, Mitragyna parvifolia*	4	20 %
5	Diabetes	*Pterocarpus marsupium, Syzygium cumini, Ficus benghalensis,*	3	15 %
6	Arthritis, Joint Pain, Rheumatism	*Madhuca longifolia, Boswellia serrata*	2	10 %
7	General Tonic	*Phyllanthus emblica*	1	5 %
8	Immunity Booster	*Phyllanthus emblica*	1	5 %
9	Inflammation	*Pterocarpus marsupium*	1	5 %
10	Ulcer	*Ficus religiosa*	1	5 %
11	Liver ailments	*Haldina cordifolia*	1	5 %
12	Bone fracture	*Mitragyna parvifolia*	1	5 %
13	Intestinal worms	*Butea monosperma*	1	5 %

Ethnomedicinal significance

The findings indicate that the indigenous communities of the Achanakmar–Amarkantak Biosphere Reserve possess extensive knowledge regarding the medicinal utilization of forest tree species. The predominance of remedies for gastrointestinal disorders, respiratory ailments, skin diseases, diabetes, and inflammatory conditions reflects the major health concerns addressed through traditional healthcare systems. Furthermore, the frequent utilization of multipurpose species such as Terminalia chebula, Phyllanthus emblica, Pterocarpus marsupium, Syzygium cumini, and Azadirachta indica demonstrates their high ethnomedicinal importance in the study area.

The present study highlights the continued dependence of local communities on medicinal tree resources and underscores the need for conservation strategies aimed at protecting both medicinal plant diversity and associated indigenous knowledge systems.

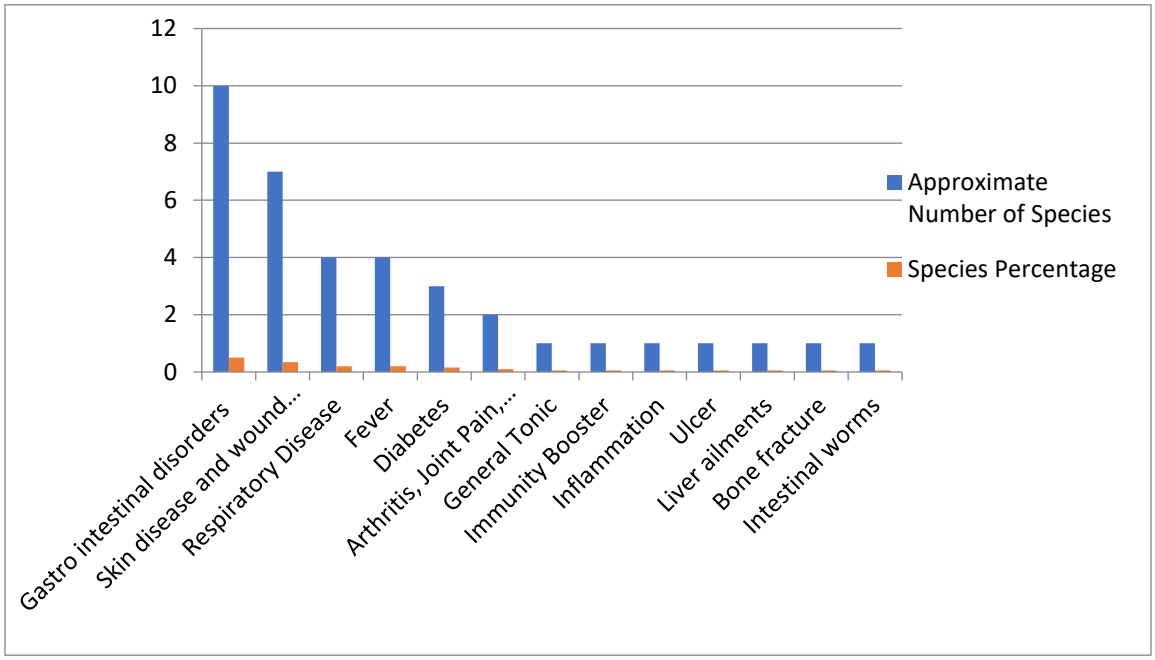

Figure 3: Therapeutic category-wise distribution of medicinal tree species

Table 5: Quantitative Summary for Discussion

Parameter	Value
Total medicinal tree species	20
Total families	14
Dominant families	Combretaceae and Moraceae (3 species each; 21.5%)
Most used plant part	Bark (14 species; 70%)
Second most used plant part	Fruit (8 species; 40%)
Major disease category	Gastrointestinal disorders (10 species; 50%)
Species used against diabetes	3 species
Species used for skin diseases/wound healing	7 species
Species used for respiratory disorders	4 species
Species used for Arthritis, Joint Pain, Bone Fracture	3 species
Species used for fever/inflammation	5 species

Discussion

The present study documented 20 medicinally important tree species belonging to 14 families from the transition and buffer zones of the Achanakmar–Amarkantak Biosphere Reserve. The findings highlight the rich ethnomedicinal knowledge possessed by indigenous communities inhabiting the biosphere reserve and emphasize the continued dependence of local populations on forest-based healthcare systems. Similar observations have been reported by Singh *et al.* (4), Tiwari *et al.* (6), and Swamy *et al.* (5), who documented extensive utilization of medicinal plants by Baiga, Gond, and other tribal communities of Central India.

The occurrence of medicinally important species such as *Pterocarpus marsupium*, *Butea monosperma*, and *Albizia lebbeck* further supports the therapeutic significance of this family in traditional healthcare systems.

Bark was the most frequently utilized plant part (70%), followed by fruits (40%) and leaves (20%). The predominance of bark usage suggests a strong reliance on woody tissues for medicinal preparations. Similar patterns have been reported among Baiga tribes of Central India (6) and in ethnomedicinal surveys of AABR (5). The predominance of bark utilization has also been reported in ethnomedicinal studies conducted in Madhya Pradesh, Chhattisgarh, Odisha, and Maharashtra (6,8). Tribal healers often prefer bark because it contains concentrated levels of secondary metabolites such as tannins, alkaloids, flavonoids, terpenoids, and phenolic compounds that possess antimicrobial, anti-inflammatory, and antioxidant properties. However, excessive bark harvesting may negatively affect tree growth and survival, particularly in species such as *Pterocarpus marsupium*, *Boswellia serrata*, *Terminalia chebula*, and *Terminalia bellirica*. Therefore, sustainable harvesting practices and conservation measures are essential for the long-term preservation of these valuable medicinal resources.

The therapeutic applications recorded in the study indicate that gastrointestinal disorders constituted the most frequently treated disease category. Approximately half of the documented species were used to treat diarrhea, dysentery, indigestion, constipation, and stomach-related ailments. This observation agrees with previous ethnobotanical studies in tribal regions of Central India, where gastrointestinal infections are among the most common health problems and medicinal plants are frequently employed as primary remedies (4,7). Species such as *Terminalia chebula*, *Terminalia bellirica*, *Aegle marmelos*, and *Phyllanthus emblica* are well-known components of traditional Ayurvedic formulations and possess scientifically validated antimicrobial and digestive properties.

Respiratory ailments formed another important disease category represented by species including *Terminalia bellirica*, *Albizia lebbeck*, *Ficus religiosa*, *Madhuca longifolia*, and *Oroxylum indicum*. The use of these species for asthma, bronchitis, and cough has been documented in several ethnomedicinal studies from Central India and reflects the effectiveness of traditional remedies in managing respiratory disorders (11). The widespread use of these species demonstrates the depth of indigenous knowledge regarding respiratory healthcare.

Several documented species were also used for the treatment of skin diseases, wounds, and infections. Notable examples include *Shorea robusta*, *Azadirachta indica*, *Schleichera oleosa*, *Buchanania lanzan*, and *Diospyros melanoxylon*. The medicinal importance of these species can be attributed to their antimicrobial, antiseptic, and wound-healing properties. Similar uses have been reported among tribal communities of Madhya Pradesh, Chhattisgarh, and Odisha, indicating a common pattern of ethnomedicinal utilization across Central Indian forest ecosystems (5).

The occurrence of antidiabetic tree species such as *Pterocarpus marsupium*, *Syzygium cumini*, and *Ficus benghalensis* is particularly noteworthy. Diabetes is increasingly becoming a major public health concern in India, and traditional herbal remedies continue to be widely used by rural and tribal communities. Recent studies conducted in the Achanakmar–Amarkantak landscape have identified these species as important components of indigenous antidiabetic formulations (10). Pharmacological investigations have also confirmed their hypoglycemic and antioxidant activities, thereby providing scientific support for their traditional use.

Species such as *Boswellia serrata*, *Mitragyna parvifolia*, and *Lannea coromandelica* were found to be associated with the treatment of arthritis, inflammation, joint pain, and bone fractures. These uses reflect the traditional healthcare practices of forest-dwelling communities, where medicinal plants play an important role in managing musculoskeletal disorders. The resin of *Boswellia serrata* is particularly valued because of its well-documented anti-inflammatory properties and is widely used in both traditional and modern herbal medicine.

Table 6: Conservation status and Significance of priority medicinal tree species

Species	Conservation Status	Significance in AABR	Major Threats	Conservation Priority	References
Pterocarpus marsupium	Near Threatened in several regional assessments	Important medicinal tree used for diabetes; valuable timber species; contributes to dry deciduous forest structure	Bark extraction, timber harvesting, poor regeneration	High	Dhyani *et al.* (12)
Boswellia serrata	Declining populations in Central India	Source of medicinal oleo-gum-resin (Salai guggul); important NTFP species for local communities	Unsustainable resin tapping, fire, habitat degradation	Very High	Warrier & Muthupandiyan (13)
Buchanania lanzan	Regionally threatened by overexploitation	Economically important NTFP species (Chironji); supports tribal livelihoods	Excessive seed collection, grazing pressure, poor seedling establishment	High	Sahu (14); Tiwari *et al.* (15)
Terminalia chebula	Widely distributed but under harvest pressure	Major ingredient of Triphala; keystone medicinal species	Commercial fruit collection affecting recruitment	Moderate–High	Ved *et al.* (16); Sen *et al.* (17)
Terminalia bellirica	Widely exploited medicinal species	Important component of Triphala; supports wildlife through fruits	Commercial harvesting and habitat disturbance	Moderate–High	Ved *et al.* (16); Sen *et al.* (17)
Madhuca longifolia	Locally abundant but heavily utilized	Critical livelihood species for tribal communities; food, medicine, oil and cultural value	Intensive flower and seed collection, land-use change	High	Kala (18); Singh *et al.* (19)

**Status based on published conservation assessments, regional reports, and medicinal plant conservation literature*

The continued use of medicinal trees by local communities demonstrates that traditional ethnomedicinal knowledge remains an important component of healthcare in the transition and buffer zones of AABR. However, increasing anthropogenic disturbances, habitat degradation, overexploitation of medicinal species, and gradual erosion of indigenous knowledge pose serious threats to both biodiversity and cultural heritage. Therefore, systematic documentation, community-based conservation programs, sustainable harvesting practices, and

scientific validation of traditional remedies are urgently needed to ensure the preservation and sustainable utilization of medicinal tree resources in the biosphere reserve.

Overall, the present study highlights the significant contribution of medicinal tree species to the healthcare practices of tribal communities in AABR and underscores the importance of integrating traditional knowledge with biodiversity conservation and sustainable forest management strategies.

The medicinal tree flora documented in the present study includes several species subjected to increasing anthropogenic pressure. Commercial harvesting of fruits, bark, resin, and seeds may adversely affect natural regeneration and population stability. Sustainable harvesting protocols and community-based conservation initiatives are therefore essential for maintaining both biodiversity and traditional healthcare resources.

Among the medicinal tree species documented in the transition zone of the Achanakmar–Amarkantak Biosphere Reserve, several possess considerable conservation significance owing to their ecological, ethnomedicinal, and socioeconomic importance. *Pterocarpus marsupium*, *Boswellia serrata*, and *Buchanania lanzan* represent high-priority conservation taxa because of increasing harvesting pressure and declining natural regeneration reported from Central Indian forests. Particularly, *Boswellia serrata* populations are threatened by unsustainable resin extraction, while *Buchanania lanzan* is subjected to extensive commercial collection of seeds for the chironji trade. Likewise, *Terminalia chebula* and *Terminalia bellirica*, the principal constituents of the traditional formulation *Triphala*, experience intensive fruit collection that may reduce recruitment in natural populations. *Madhuca longifolia* holds exceptional socioeconomic value for indigenous communities of the biosphere reserve, providing food, medicine, oil and livelihood resources. The conservation of these species is therefore essential not only for maintaining forest biodiversity but also for sustaining traditional healthcare systems and the livelihood security of local tribal communities. Sustainable harvesting practices, community participation, and *in situ* conservation strategies should be integrated into biosphere reserve management plans to ensure their long-term persistence.

Conclusion

The present study documented 20 medicinally important tree species belonging to 14 families from the transition and buffer zones of the Achanakmar–Amarkantak Biosphere Reserve. Combretaceae and Moraceae emerged as the dominant family, while bark was identified as the most frequently utilized plant part. The recorded species were primarily used for the treatment of gastrointestinal disorders, respiratory ailments, skin diseases, diabetes, and inflammatory conditions. The findings demonstrate the continued dependence of indigenous communities on forest-based medicinal resources and highlight the rich ethnomedicinal knowledge preserved within the region. However, increasing anthropogenic pressure and unsustainable harvesting practices threaten several medicinally valuable species. Therefore, systematic documentation, scientific validation, sustainable utilization, and conservation of medicinal tree resources are necessary to preserve both biological diversity and traditional knowledge systems within the biosphere reserve.

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