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An ethnomedicinal study of a few indigenous plants used by the folklore of Gorakhpur District, Uttar Pradesh

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ABSTRACT

The loss of cultural practices can cause reduced social adherence and community health challenges because an individual's culture is closely linked with their sense of identity and belonging to a community. Furthermore, the association of medicinal plants and the indigenous knowledge of local people have made the two components inseparable in many ways. Rapid modernization leads to people dropping traditional living ways. This is a systematic outline of the scientific literature in tabular format procured and arranged via online and offline data sources.Though India has been successful in advancing indigenous medicine at a global level, more large-scale research is needed. This article gives an inside into the ethnomedicinal plants. The local healers use them to cure fever and cardiovascular, neurological, and hematological disorders. An attempt to compile plants utilized by common folklore and their conservation has been made. Despite the progress or breakthrough in modern medical science, there is an inadequate supply of quality healthcare to all. Rural and isolated localities still utilize their ethnic plants for basic needs. The ethnomedicinal data may provide a base to start searching for new compounds related to pharmacognosy. A study on native uses was carried out by extensive literature assessment revealing the abundance of medicinal flora and vast taxonomic work in this region.

Keywords: *Ethnomedicine, Flora, Gorakhpur, Medicinal plants, Secondary metabolites.*

1. Introduction

The pandemic has taught the world to be self-reliant in all aspects and to shift the primary focus to the health network. It also brought us back to traditional medical systems for the cure of instant symptoms. The countries with the best healthcare facilities will become prosperous in the future.India is one of the world's top twelve biodiversity countries. The terrestrial position and advantages of climate conditions for distinct floral ranges. Plants flourish in forests, on wasteland, agriculture fields, aquatic bodies, near roadsides, houses, and open areas. Ethnobotany is the study of the relationship between people of a primitive society and plants [1].

It works as a direct chord between man and nature as an interdisciplinary science field. A good part of the natural drugs come from forest species. A few are cultivated or are present in the form of weeds. The conventional modes of administration are decoctions, pastes, powders, juices, and pills. The plant itself or its different parts can be employed in the therapy of ailments. A review of the literature discloses that information on the bioactive components and pharmacology of most of a few species is familiar. These studies are of high importance for India, where the medicinal flora is quite rich, and a substantial number of rural populations still rely on herbal drugs for their longevity. A normal understanding of preserving plants in medicine from ethnobotanical under-explored areas has been observed. The data should be compiled before it goes off track with the diminishing folkloristics and increasing urbanization.

Gorakhpur district flora has been assembled as flora gorakhpurensis [2]. A lot of research has been contributed to Gorakhpur flora by eminent researchers like [3], [4], [5], [6] [7]. The taxonomic strength and knowledge of this area have been at the top by the contribution of these scientists.

Considerable work on vegetation heterogeneity of the madhulia forest has been done [8]. [9]reported*Cnidium monnieri* (L.) Cusson from the madhulia forest of Gorakhpur. Data to conserve genes of five threatened medicinal plants from the madhulia forest [10]. Climatic conditions have a great impact on the growth of plants. [11] Studies on the association of flowering time with rainfall and temperature on the growth of wild Asteraceae specieswas done. 125 aquatic angiosperms inthe Gorakhpur district[12]. Scientists in the vegetation of the region have made a significant contribution. Some studied floral diversity in the sal forest of Gorakhpur [13]. They adjoined twenty new species of the Asteraceae family to flora gorakhpurensis [14], [15]and added six novel species to the flora of Gorakhpur in the family Fabaceae [16]. It talked about approximately 100 species colonizing the wetlands of Gorakhpur and their commercial importance. Sal forest comprises lower areas dwell on yellow clayey alluvial soil with fewer type of grasses. They are dominant in Gorakhpur, Bahraich, Gonda districts. The areas along the Rohini River in Gorakhpur district are home to *Terminalia alata* forests. In this chapter, we make a focused appraisal of the rich ethnobotanical wealth and the immense contribution of the researchers in this area.

2. Methodology

Relevant information from the literature was extracted from online sources and from data sources such as Google Scholar, Elsevier, Web of Science and PubMedCentral (PMC). Keywords such as Ethnomedicine, flora, traditional medicine, secondary metabolites, and medicinal plants were used for searching online literature work. Based on different data sources, we made several findings. Table. 1 represents important secondary compounds of ethnomedicinally important plants. Table. 2represents a systematic arrangement of plants used by ethnics of Gorakhpur district.

3. Traditional medicine practices in India

The customary medicinal practice like Ayurveda, Siddha, and Unani in India advocates the utilization of plant parts. Roughly, fifty thousand plant species were used as traditional medicines in distinct forms [17. The Indian government has created a separate department to serve as the head office for traditional and complementary medicine AYUSH (Department of Ayurveda Yoga Unani Siddha and Homeopathy). Many research institutions like the Indian Ayurveda Scientific Research Centre (IASRC)and private institutions are engaged in traditional medicine in India [18].

Ayurveda is a holistic healing practice. It validates that one's health counts on the equilibrium between mind, body, and soul. It aims at elevating good health and assumes that every human being is comprised of five basic elements found in the universe – space, air, fire, water, and the earth. Ayurveda is the flag bearer of India's vast traditional medicinal legacy. There are three types of life forces or energy known as doshas - gas (Vata dosh), bile (pitta), and mucus (kaph). The balance of these three communicates to the health of an individual. Any variation in this leads to diseases that need to be restored by proper medicine and diet plans. There are four prime assemblies of documents narrating various types of knowledge and thoughts in the Vedic era - the Rigveda, Samaveda, Yajurveda, and Atharvaveda. Atharvaveda comprises the medical portions and treatment strategies. It incorporates herbal medicines, herbal oils, yoga, and enema practices [19].

Unani medicine is a type of traditional medicine practice in the Middle East and South Asian countries. Its origin dates to Greece. An extensive system offers precautionary healing and rehabilitative healthcare. The generic personality and temper of the patient are given great importance in the treatment method emphasizing the diet plan and digestion. Arising from the Tamil word Siddhi which means an "object to be accomplished", this medicine form is exercised predominantly in South India. Unani practice deciphers methods to nourish the soul that comprehends a healthy body, a subject taught in private and government colleges in Kerala and Tamil Nādu [20].

3.1 Geographical distribution and vegetation

The forest of Gorakhpur is floristically rich and occupied by numerous ethnic groups. This area has not been studied widely in consideration of plants used as curative by the local folks and forest dwellers. Low-lying land stretches out in the north of the Indo-Gangetic plain through the foothills of the Central Himalaya and is known as the Terai region [21]. The terai region of Uttar Pradesh is abundant in plant diversity and high humidity leads the way to the occurrence of several body infections and illnesses. The Gorakhpur district is located between 26° 5' to 27° 29' N latitude and 83° 20' to 84° 10' E longitude.

Forest vegetation is of semi-evergreen form with several deciduous elements. The edaphic factor, soil, is built up by Gangetic alluvium brought down by the Rapti, Rohini, Ghagra, and Gandak rivers from the Himalayas [22]. A checklist of around thirty tree specieswas formed and it was found that the family Fabaceae held the highest species diversity in this belt. A few trees in this region fall under the IUCN red data list [23].

The forest of the Gorakhpur division has a large proportion of sal trees [24]. This terai belt has a thick forest cover. The flora of the forests comprises trees, shrubs, herbs, and climbers. [25] The presence of exotic weeds in Gorakhpurwas narrated.Various herbaceous plants are periodically visible during the rainy season [26].The forests of Gorakhpur district incorporate Campierganj, Kusumi, Madhulia, Nichlaul, Tehrighat, and Tinkonia forest areas, all of which have lavish species diversity. Wetlands existing in this region are known as tals or Pokhara. A few remarkable ones includeChilwatal, Mahesaratal, and Ramgarh tal. Many medicinal angiosperms are recorded from this area [27].

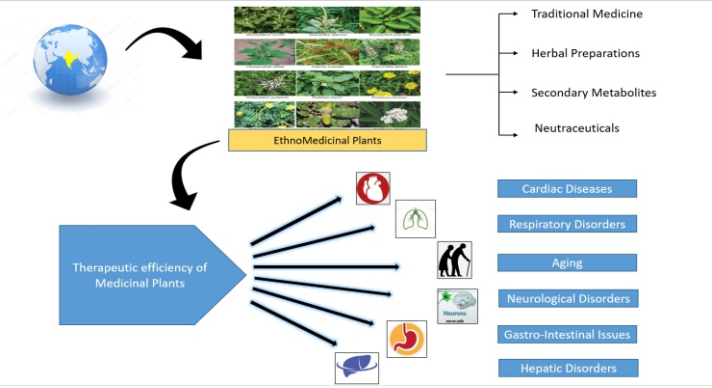


Figure. 1: Illustration of ethnic plants and their modes of usage.

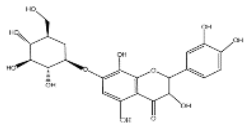
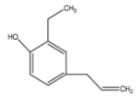
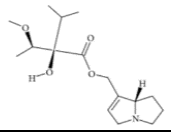
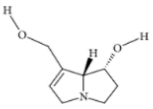
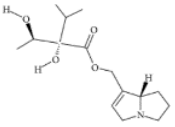
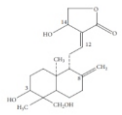
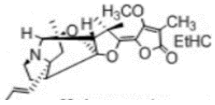
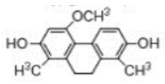
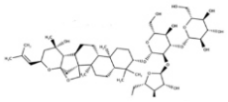
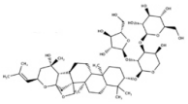
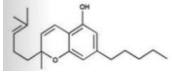
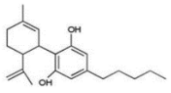
3.2 Importance of ethnomedicinal studies

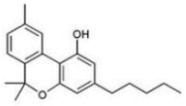
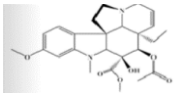
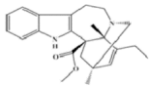
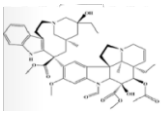
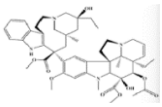
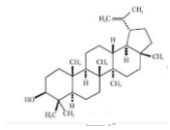
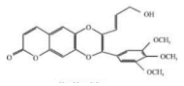
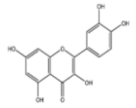
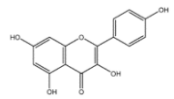
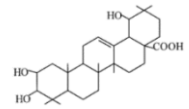
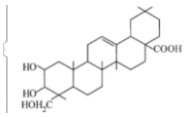
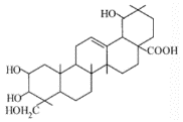
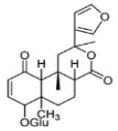
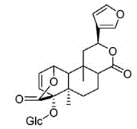
Humans have been one that needs to rely upon plants since the ancient era for food, shelter, fuel, and clothing. The worth of medicinal flora to humanity is well known. Nature has been the route of contemporary drugs that have been identified. There are a variety of plant species in Uttar Pradesh availed by people in different forms for medicinal purposes (Figure.1). The plant wealth is divided into myriad groups based on their application - a). Ethnomedicinal plants, b). Wild edible plants, c). Fiber-yielding plants, d). Timber and wood-yielding plants, e). Oil-yielding plants, f). Ornamental plants, g). Gum and resin yielding plants, h). Tanin yielding plants.

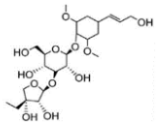
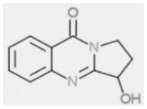
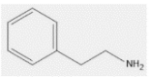
The tribal communities like baigas, ghariar, gonds, kharwar, Kol, tharus, bhotia, jaunsari, and vantangia dwelling in forest and villages of Sonbhadra, Kheri, Allahabad, Bahraich, Gorakhpur, Jhansi, and Gondautilize plants in curing diseases [28]. The native people have significant knowledge of the wild plants and the method of their implementation. Tribal structures are the depository of data on the miscellaneous uses of plants. [29] studied medicinal plants used by the Tharu tribe in the Gorakhpur area against various diseases. The ethnomedicinal practice of medicinal plants and the mode of usage by tharu tribes in diseases like malarial fever, and piles has been elaborated by [30]. Increasing attention to the usage of various herbal medicines requires information about different herbal preparations. Phyto medicines are broadly acknowledged and used as a substitute for medicine which is accredited to the phytochemicals found in them (Table.1). People use plants and animals as a rich source of nutrition and medicine.

Ethnobotany and ethnomedicinal studies are today recognized as the most feasible method of identifying new medicinal plants. The tribal and rural people of various parts of India are conditioned towards medicinal plants to yield to their health demands.Human beings have always implemented the endemic flora not only for nourishment but also for medicine and fuel. That traditional understanding of these plants is making its way from generation to generation. Isolation, purification, and identification of active metabolites from plants authenticate their utilization in medicinal preparation. Research on phytochemical and biological constituents of plant species has gathered worldwide momentum. This response by scientists is of great use to the tribal community that has less or no approach to modern health practices.Scientific assessment of medicinal plants could play a vital role in the discovery of novel drugs (Table.2). The resultant explanation of the various toxic risks associated with the use of herbal preparations can be known.

Table.1: Secondary metabolites from some important ethnomedical plants

Sr. S.No.	Plant Name	Chemical constituents	Structure	References
1	*Abutilon indicum* (L.) Sweet	Gossypetin-7-glucoside		[31]
		Eugenol		
2	*Heliotropium indicum* L.	Heleurine		[32]
		Retronecine		
		Supinine		
3	*Andrographis paniculata* (Burm. f.) Wall ex Nees	Andrographolide		[33]
4	*Asparagus racemosus*Willd.	Asparagamine		[34]
		Racemosol		
5	*Bacopa monnieri* (L.) Wettst	Bacoside A3		[35]
		Bacopaside X		
6	*Cannabis sativa* L.	Cannabichromene		[36]
		Cannabidiol (CBD)		

6		Cannabinol (CBN)		
7	*Catharanthus roseus* (L.) G. Don.	Vindoline		[37]
		Catharanthine		
		Vincristine		
		Vinblastine		
8	*Hemidesmus indicus* (L.) R. Br.	Lupeol		[38]
		Hemidesminine		
9	*Moringa oleifera* Lam.	Quercetin		[39]
		Kaempferol		
10	*Terminalia arjuna* (Roxb) Wight &Arn.	Arjunic Acid		[40], [41]
		Arjunolic Acid		
		Arjungenin		
11	*Tinospora cordifolia* (Willd.) Miers ex Hook. F. &Thoms	Tinosporiside		[42]
		Palmitoside F		

11		Cordifolioside A		
12	*Sida cordifolia* L.	Vasicinone		[43]
		β-Phenethylamine		

3.3 Challenges faced in traditional medicinal practices

Despite global recognition and acceptance, the herbal medicines utilized by traditional healers are still prone to various checkpoints [44]. A few challenges that come in their way are:

- Concerns about quality: adulteration and misinterpretation of plant species reduce the authenticity of herbal preparations.
- Pharmacovigilance: the detection, treatment, and prevention of adverse drug reactions. Its role is to advocate and monitor safety methods, convey risks, and assess the advantages of medicine.
- Clinical trial: safety comes first. There are methods to encourage clinical trials to demonstrate the effectiveness of drugs.
- Research: Suitable work on the dose composition should be done as any miscalculated dose can regress the positive factors. Recently, a lot of research has been directed at decoding the chemical constituents that target certain diseases. There is still a gap in ethnomedicinal and contemporary medicinal plant research.
- Bio-piracy: institutions and nations possessing scientific information and genetic resources without a license. Recognition and proper attestation of folk medicinal knowledge is key to their safety.
- Processing issues: poor agricultural practices and careless harvesting degrade the drug standard.
- Infrastructure: there is a shortage of professionals and skilled workers, and instruments are difficult to obtain [45].

Table.2: List of ethnomedicinal plants utilized in various diseases.

Disease				
Botanical name	**Family**	**Local name**	**Part used / Modes**	**References**
Bronchitis				
Abutilon indicum(L.) Sweet	Malvaceae	Kanghi, Atibala	Roots, bark and leaves	[46]
Abrusprecatorius L.	Fabaceae	Ratti, gunchi	Leaves	[47]
Achyranthes aspera L.	Amaranthaceae	Chirchita, latjira, madhukar	Aqueous extract of whole plant administered	[48]
Adhatodazeylanica Medic.	Acanthaceae	Vasaka	Flowers, whole plant	[49]
Bacopa monnieri(L.) Wettst	Scrophulariaceae	Neer Brahmi	Leaves, tender shoots	[50]
Calotropis procera (Ait) R. Br	Asclepiadaceae	Madar	Root in asthma	[51]
Cannabis sativa L.	Cannabinaceae	Bhaang	Leaf, fruit	[52]
Prosopis cineraria (L.) Druce	Fabaceae	Jhand	Bark	[53]
*Sida acuta*Burm. f.	Malvaceae	Baraira	Whole plant paste mixed with pepper and garlic is applied	[54]
Sida cordifolia L.	Malvaceae	Bariyar	Whole plant paste mixed with pepper and garlic is applied	[55]
Tinospora cordifolia (Willd.) Miers ex Hook. F. &Thoms	Menispermaceae	Giloy, gurch	Whole plant, leaves are expectorant	[56]
Cardiovascular				
*Boerhaaviadiffusa*L.	Nyctaginaceae	Biskhapara	Young shoots, leaves	[57]
*Emblica officinalis*Gaertn.	Phyllanthaceae	Aonla, amla	Fermented liquor from fruits in arteriosclerosis and cardiac tonic	[58]
*Terminalia alata*Heyne ex Roth	Combretaceae	Asan, sain, saj	Leaves	[59]
Terminalia arjuna (Roxb) Wight &Arn.	Combretaceae	Arjuna	Bark	[60]
*Terminalia chebula*Retz.	Combretaceae	Harra, haritak	Ripe and unripe fruit	[61]
Tinospora cordifolia (Willd.) Miers ex Hook. F. &Thoms	Menispermaceae	Giloy, guduchi	Whole plant	[62]
Withaniasomnifera	Solanaceae	Ashwagandha	Leaves, fruit, leaves	[63]

Diabetes				
Acacia nilotica(L.) Del. ssp. indica (Benth.) Brenan	Mimosaceae	Babool	Seedpods and flowers	[64]
Aegle marmelos (L.) Correa	Rutaceae	Bel	Leaves, is laxative	[65]
Annona squamosa L.	Annonaceae	Sitaphal, sharifa	Leaf decoction and root bark	[66]
Cassia fistula L.	Fabaceae	Amaltas, swarn-pushpi	Flowers, flower buds, ripened pulp	[67]
Catharanthus roseus (L.) G. Don.	Apocynaceae	Sadabahar	Leaf juice	[68]
Coccinia cordifolia (L.) Cogn.	Cucurbitaceae	Kundru	Fruits	[69]
Diplocyclospalmatus (L.) Jeffrey	Cucurbitaceae	Kawabel	Leaves juice given	[70]
Ficus benghalensis L.	Moraceae	Bargad	Bark	[71]
Madhuca longifolia var.*latifolia* (Roxb.) A. Chev.	Sapotaceae	Mahua	Dried bark powder	[72]
Mangifera indica L.	Anacardiaceae	Aam	Leaves improve insulin production	[73]
Moringa oleifera Lam.	Moringaceae	Sehjan	Leaves, fruits, flowers	[74]
Murrayakoenigii (L.) Spreng	Rutaceae	Katnim	Leaves, bark	[75]
Rumex hastatus D. Don.	Polygonaceae	Khatti butti	Aerial parts decoction	[76]
Saracaasoca (Roxb.) Willd.	Fabaceae	Sita ashok	Fruit, dried flowers	[77]
Syzygiumcumini Linn.	Myrtaceae	Jaamun	Dried fruit and bark powder	[78]
Fever				
Abutilon indicum (L.) Sweet	Malvaceae	Kanghi	Roots and seeds	[79]
Bacopa monnieri (L.) Wettst.	Scrophulariaceae	Brahmi	Whole plant decoction daily in fever	[80]
Caesalpinia crista L.	Caesalpinaceae	Latakaaranj	Root, stem, seeds, leaves	[81]
Catharanthus roseus (L.) G. Don.	Apocynaceae	Sadabahar	Leaf decoction in malaria	[80]
Cyperus rotundus L.	Cyperaceae	Motha	Rhizome decoction in malaria	[80]
Leucas aspera (Willd.) Link	Lamiaceae	Gooma	Leaf decoction with milk in fever	[80]
Ocimum sanctum Linn.	Lamiaceae	Tulsi	Whole plant used and leaf decoction	[82]
Rauvolfia serpentina (Linn.) Benth ex Kurz	Apocynaceae	Dhamarbarua	Decoction by crushing leaves with black pepper	[83]
Solanum nigrum Linn.	Solanaceae	Kali makoi	Root decoction in fever	[84]
*Solanum surattense*Burm. f.	Solanaceae	Bhat kattaiya	Leaves boiled in water given	[85]
Strychnosnux-vomica Linn.	Loganiaceae	Kuchla	Powdered seeds	[86]
Tinospora cordifolia (Willd.) Miers ex Hook. F. &Thoms	Menispermaceae	Giloy	Stem and roots	[69]
*Vernonia cinerea*Less.	Asteraceae	Sahdevi	Whole plant used as decoction for perspiration in fever	[87]
GI diseases				
Ageratum conyzoides L.	Asteraceae	Visadodi	Leaves	[88]
Caesalpinia bonduc (L.) Roxb.	Fabaceae	Kat-karanj, Karja	Seed powder in gastric	[70]
Carica papaya L.	Caricaceae	Papita	Leaves, fruits	[89]
Cassia fistula L.	Fabaceae	Amaltas	Bark, leaf, fruit pulp is laxative	[90]
Cynodondactylon Linn.	Poaceae	Doob ghaas	Whole crushed plant in dysentry	[80]
Delonix regia (Bojer ex Hook.) Raf.	Fabaceae	Gulmohar	Leaves, fruit, seed powder have gastro-protective role	[70]
Ficus racemosa L.	Moraceae	Goolar	Bark, leaf, root, figs	[91]
Mimosa pudica L.	Fabaceae	Chhui-mui, lajwanti	Leaves, roots	[92]
Morus alba L.	Moraceae	Shahtoot, tutri	Leaves, bark, fruit	[93]
*Shorearobusta*Gaertn f.	Dipterocarpaceae	Sal, saakhu	Bark, leaves, flowers	[94]
Tinospora cordifolia (Willd.) Miers ex Hook. F. &Thoms	Menispermaceae	Giloy, guduch	Plant and leaf decoction	[95]
*Zingiber officinale*Rosc.	Zingiberaceae	Adrak, aduaa	Rhizome in stomachache	[69]

Gynecological disorders				
Abutilon indicum (L.) Sweet	Malvaceae	Kanghi, atibala	Leaves, root, fruit, seeds in strengthening female reproductive parts	[96]
Acacia nilotica (L.) Delile.	Fabaceae	Babool, kikar	Seed pods, flowers	[97]
Argemone mexicana L.	Papaveraceae	Bhadbhad	Leaf juice given to prevent leucorrhea	[98]
*Asparagus racemosus*Willd.	Asparagaceae	Shatavari	Young shoot and tuberous root nourish female reproductive organs	[99]
*Ficus hispida*L.f. Suppl.	Moraceae	Kath-goolar	Boiled green fruits given to lactating mother	[98]
Hemidesmus indicus (L) R. Br.	Asclepiadaceae	Anantmul	Leaf paste taken orally for leucoderma	[100]
Linumusitatissimum L.	Linaceae	Teesi	Seeds	[101]
Mimosa pudica Linn.	Mimosaceae	Chhui-mui, lajwanti	Whole plant extract used with ground leaves	[92]
Tephrosia purpurea (L.) Pers.	Fabaceae	Sharpunkha	Leaf decoction given in post-natal issues	[100]
Jaundice				
Aegle marmelos L.	Rutaceae	Bel	Fruit pulp	[102]
Andrographis paniculata (Burm. f.) Wall ex Nees	Acanthaceae	Kalmegh	Dried leaves powder taken orally. Leaf decoction for liver problems.	[103]
Argemone Mexicana L.	Papaveraceae	Bhadbhand	Latex used in liver issues	[104]
*Asparagus racemosus*Willd.	Asparagaceae	Shatavar	Root decoction	[105]
Boerhaaviadiffusa L.	Nyctaginaceae	Punarnava	Roots	[80]
Cassia fistula L.	Caesalpinaceae	Amaltas	Fruits utilised	[106]
Centella asiatica (L.) Urb.	Apiaceae	Brahmi, gotu-kala	Leaves and young stem	[107]
Curcuma longa L.	Zingiberaceae	Haldi	Rhizome	[69]
Hygrophila spinosa T. Anders.	Acanthaceae	Talmakhana	Leaves and aqueous root extracts	[69]
Phyllanthus niruri L.	Euphorbiaceae	Bhumi amla	Whole plant consumed in powdered or paste form	[80]
Piper longum L.	Piperaceae	Pipali	Root, fruit decoction used	[70]
Ricinus communis L.	Euphorbiaceae	Arand	Leaf extract	[108]
Rumex dentatus Linn.	Polygonaceae	Ambavati	Root and fruits	[109]
Solanum nigrum L.	Solanaceae	Kali makoi	Leaves and fruits	[110]
Neurological disorders				
Bombax ceiba L.	Bombacaceae	Semal	Root extract	[111]
Cannabis sativa L.	Cannabinaceae	Bhaang	Flowers and fruits	[112]
Centella asiatica (L.) Urb.	Apiaceae	Mandukparni, Brahmi booti	Whole plant improves mental disorder	[113]
Colebrookeaoppositifolia Sm.	Lamiaceae	Binda	Root extract in epilepsy	[114]
Conscora decussata (Roxb.) Roem&Schult.	Gentianaceae	Sankhapushpi	Plant used as a tonic in nervous complication	[115]
Sida cordifolia L.	Malvaceae	Bariyar	Root extracts	[116]
Piles				
Cannabis sativa L.	Cannabinaceae	Bhaang	Leaves	[26]
Calotropis procera(Ait.) R. Br.	Asclepiadaceae	Madar	Flowers used	[117]
Scoparia dulcis L.	Plantaginaceae	Meethipatti, ghodatulsi	Leaf juice is given with black pepper powder	[70]
*Terminalia chebula*Retz.	Combretaceae	Harad	Fruits are used. Important part of triphala.	[118]
Skeletaldisoeders				
*Adhatodavasica*Nees	Acanthaceae	Arusa	Leaves, roots, flowers to treat rheumatoid arthritis	[69]
*Alstoniascholaris*Linn. R. Br.	Apocynaceae	Saptaparn	Leaves extract in joint pain	[119]

Cissus quadrangularis Linn.	Vitaceae	Hadjod	Applied topically to fractured bones	[120]
Gloriosa superba Linn.	Liliaceae	Kalihari	Root decoction with sesame oil massaged on joints	[121]
Helminthostachyszeylanica (L.) Hk.	Ophioglossaceae	Kamraj	Rhizome paste applied in rhreumatism	[122]
Hemidesmus indicus(L.) R. Br.	Asclepiadaceae	Anantmol	Root applied on swellings	[123]
Leea indica (Burm. f.) Merril	Leeaceae	Harjora	Leaf and root paste applied on fractures	[70]
Listeamonopetala (Roxb.) Pers.	Lauraceae	Medh	Stem bark paste with ammonium chloride on fractures	[70]
Moringa oleifera Lam.	Moringaceae	Sehjan	Leaves and fruit consumption relieves arthritis pain	[124]
Ricinus communis L.	Euphorbiaceae	Arand	Leaves extract for relieving bone pain	[107]
Sida acuta Burm. f.	Malvaceae	Baraira	Whole plant	[125]
Tinospora cordifolia Willd.	Menispermaceae	Giloy	Root, stem and leaves	[126]
Skin disorders				
Ageratum conyzoides L.	Asteraceae	Visadodi	Whole plant used in skin problems	[127]
Aloe vera Linn.	Liliaceae	Ghritakumari	Leaf juice reduces scars and acne	[128]
Azadirachta indica A. Juss.	Meliaceae	Neem	Leaf, bark, root	[69]]
Cleodendrum indicum (L.) Kuntze	Lamiaceae	Sankuppi	Stem cuttings tied around neck and leaf paste applied on skin	[129]
Ficus religiosa L.	Moraceae	Peepal	Bark and young shoots	[130]
Fumaria indica (Haussk.) Pugsley	Fumariaceae	Ban gajar	Plant decoction to purify blood in skin issues	[131]
*Nelumbo nucifera*Gaertn. Fruct.	Nymphaeaceae	Kamal-gatta	Root and seed extract in skin disease	[132]
Solanum indicum L.	Solanaceae	Badikateri, bruhati	Root and leaves decoction	[133]
Snake bites				
Achyranthes aspera Linn.	Amaranthaceae	Chirchita	Whole plant extract and root extract given	[134], [135]
Albizzia lebbeck(Linn.) Benth.	Fabaceae	Shirisha	Dilute root paste taken orally and applied on bite	[80]
Amaranthus spinosus L.	Amaranthaceae	Chaulai	Root paste applied	[80]
Cassia fistula Linn.	Caesalpiniaceae	Amaltas	Paste of stem and root bark applied.	[136]
Ecliptaprostrata (Linn.)	Asteraceae	Bangraiya	Leaf paste applied externally	[137]
Heliotropium indicum L.	Boraginaceae		Leaf juice with hot water	[138]
*Leucas aspera*Spreng.	Lamiaceae	Thumbhai	Leaf and root used externally and orally.	[139]
Mimosa pudica Linn.	Mimosaceae	Chhuimui	Whole plant extract used and leaves ground, applied	[140]
Momordica charantia Linn.	Cucurbitaceae	Karela	Juice of shoot and roots given	[137]
Tephrosia purpurea (L.) Pers.	Fabaceae	Sarphankla	Root decoction and pod extract to reduce inflammation	[134]
Tiliacora acuminata (Lam.) Hook. f. &Thoms.	Menispermaceae	Karwat	Root decoction	[70]
Vitex negundo Linn.	Verbenaceae	Nishindi	Leaf paste and root paste applied	[138] [141]

4. Conservation strategies

The conservation objective is to safeguard assets so that a wide variety of genes and habitats are not exhausted. Such objectives fall under biodiversity conservation. Many traditional specialists involve medicinal plants in therapeutic and productive applications. The sudden rise in their demand has put survival threats to biodiversity at risk. The first conservation practice is to let the plant species grow and mature in their natural habitats. This can be attained by building national parks and nature reserves that come under *in-situ* conservation methods. It can be handled in a way that as many wild species can pursue living in managed habitats. There should be appropriate identification techniques for the plants dwelling *in-situ* and their relevant tracking procedures. *In-situ* species represent *in-situ* genetic variation. It includes biosphere reserves, sacred grooves, and national parks. It is a preventive measure for species that are at risk of destruction. The *ex-situ* conservation method is a preferred method to nurse species in their authentic niche. *Ex-situ*conservation can be achieved by plantation of medicinal species along roadsides, near homes, and around government offices to preserve rare threatened species. Nevertheless, it is also encouraged to conserve them outdoors in their natural habitat. Such procedures make the collection of plant species more accessible for research agriculture practices and educational methods from *ex-situ* sides rather than from *in-situ*.

Practicing *in vitro* tissue culture methods for threatened plant propagation is also ideal. It is mainly done for species enduring habitat destruction. It is also carried out for threatened and regionally extinct plants. Seed banks'and botanical gardens are examples of *ex-situ* conservation methods [142]. Many seeds can be conserved but this has the advantage as it depends on electrical supplies and thorough vigilance. Customary practices to conserve plants include curbing people from cutting down trees and organizing tree-planting programs. Ethnic people consider that the healing effect of wild plants was lowered by farming practices. Thus, they do not appreciate the farming of wild-grown plants [143]. Utilization of ethnobiology knowledge involves:

- Correct documentation and preservation of traditional medicinal plant knowledge.
- A genuine networking program is needed so that traditional healers from one community
- interact with the other to widen their understanding.
- Establishment of affinity between conservation and merchandising of medicinal plants.
- Development of medicinal plant nurseries so that seedlings can be raised.
- Conservation of threatened species of medicinal plants and their territories.
- Encouraging people to plant medicinal plants with support from the government and medicalofficers.
- A structure established to provide traditional healing to communities and raise awareness about their conservation methods. The core motive is the generation of demand for ethnomedicine in the treatment of common ailments.

5. Discussion

It is an undisputed topic that modern medical terms provide quick relief from body suffering. The tribal have been treating incurable diseases with the herbs there, but in recent times, there are a few people left to identify those rare herbs of the forest.

Natural treatment methods take a long time, but they help remove the root cause of the ailments. Many diseases are still incurable by allopathy practices and our hope lies in herbal medicines. Modern-day genetic engineering practices shall be incorporated near forest areas to facilitate tissue culture, micropropagation, and breeding procedures to improve plant productivity. Good agricultural practices improve the yield. Practicing such methods will help in promoting local knowledge of people at the global level. Sustainable use and proper harvesting methods also need to be practiced. Instead of pulling out an entire medicinal plant, practices to pick only the part to be used as leaves or flowers should be generalized. The survey of pharmacological work and literature on medicinal plants has great significance. Many studies have been made on plant diversity but are very limited in their pharmacokinetics. Even in present times, it is unreasonable to exist without plants.The forthcoming generation has less interest in ancestral treatment ways, and we need to teach them about our rich floral wealth and the unique properties that they exhibit. The prospect is to document the data and seek the attention of the researchers towards this large sea of information and remedies.

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Conflict of interest

The authors declare no conflict of interest.

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