



Ethnomedicinal Uses of Various Plant Species in Panchase Protected Forest

Asmit Neupane^{1*}, Anisha Dhakal¹, Urusha Lamsal¹, Barsha Sharma², Roshna Thapa³

¹ Tribhuvan University, Institute of Forestry, Pokhara Campus, Pokhara 33700, Nepal

² Tribhuvan University, Kathmandu Forestry College, Kathmandu, 44600, Nepal

³ Agriculture and Forestry University, College of Natural Resource Management (CNRM), Katari 56310, Nepal

Abstract

Ethnomedicinal plants, which have been utilized by indigenous communities in Nepal for centuries, hold promise for treating various ailments. Globally, medicinal plants are integral to healthcare systems, with Nepal renowned for its rich biodiversity and indigenous knowledge. This manuscript explores the ethno-medicinal practices within Nepal's Panchase protected forest, aiming to validate traditional remedies and contribute to healthcare improvement. Through a comprehensive study involving reconnaissance surveys, interviews, and data analysis, 103 ethno-medicinal plants from 58 families were documented, with Asteraceae being dominant. Various plant parts were utilized for treating 57 ailments, with leaves being most common. Gastrointestinal issues were prevalent, with plants such as *Aloe vera* and *Terminalia chebula* being frequently employed. Additionally, plants such as *Colebrookea oppositifolia* and *Centella asiatica* were used for fever and migraine, while *Rorippa* species and *Nephrolepis* species addressed blood pressure and diabetes concerns. This study focuses on the importance of traditional medicine in rural healthcare and underscores the need for its preservation. Conservation efforts and intergenerational knowledge transfer initiatives are vital to safeguarding indigenous wisdom. Phytochemical and pharmacological studies are recommended to validate traditional knowledge scientifically. The commercial cultivation of medicinal plants could alleviate pressure on natural habitats and promote sustainable healthcare practices. This research contributes to the documentation of valuable ethno-medicinal knowledge, emphasizing its potential for socioeconomic development and healthcare enhancement in Nepal's rural communities.

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Introduction

Throughout history, medicinal herbs have played a vital role in promoting health and healing worldwide (Dhakal et al., 2023). Nepal stands out for its diverse array of healing herbs and aromatic plants, boasting more than 10,000 plant species, including more than 1,600 with medicinal properties (Singh et al., 2012). Ethnomedicinal plants, which are abundant in bioactive compounds, have been employed for centuries by indigenous cultures for therapeutic purposes, providing accessible and often side effect-free alternatives to modern



medicine (Laldingliani et al., 2022). Traditional medicine, encompassing diverse cultural practices, has long integrated herbal remedies, garnering attention from researchers worldwide (Ahmad and Beg, 2001). Traditional healing systems such as Ayurveda and Tibetan medicine rely heavily on these herbs, which make up approximately 25% of Nepal's vascular flora (Bhattarai, 1997). However, there is increasing concern regarding the loss of native knowledge attributed to factors such as biodiversity decline and socioeconomic changes. This underscores the importance of documenting and researching traditional medicinal practices (Singh et al., 2012; Kunwar et al., 2016).

The global demand for herbal medicine is steadily increasing, particularly in underdeveloped regions where more than 80% of people depend on it for primary healthcare due to limited access to conventional medical services (Pandey et al., 2013). As a result, the market for medicinal plant products has grown exponentially, surpassing \$100 billion annually (Acharya et al., 2012). With their lower incidence of adverse effects and higher patient adherence rates, medicinal herbs are increasingly favored for disease prevention, complementing conventional medical treatments (Brown et al., 2008). Engaging local communities in the conservation and utilization of medicinal plants in Nepal's rural areas is essential for sustainable development, ensuring the preservation of these valuable resources for future generations (Ambu et al., 2020).

Nepal is renowned for its abundant medicinal plants and indigenous knowledge regarding its utilization (Kunwar et al., 2022). Passed down through generations, this traditional wisdom plays a vital role in healthcare and income generation for rural communities (Kunwar, 2002). Studies on these plants not only help preserve traditional practices but also contribute to the development of cost-effective therapies and the conservation of biodiversity (Shrestha and Dhillon, 2003; Purohit and Vyas, 2004). In Nepal, particularly in rural areas, ethno-medicinal plants serve as crucial healthcare resources where access to modern medicine is limited (Shrestha et al., 2019). Studies in Eastern Nepal have revealed the traditional use of plants for medicinal, fodder, and edible purposes (Nepal et al., 1999). Similarly, in the Macchhapuchhre Rural Municipality of Kaski District, ethno-medicinal plants play a key role in treating various ailments, notably gastrointestinal disorders (Adhikari et al., 2019). Medicinal plants, with various plant parts utilized for therapeutic purposes, hold significant cultural and economic value for ethnic groups in Nepal (Miya et al., 2020). Panchase forests, which are rich in medicinal plants and nontimber forest products, present opportunities for sustainable microbusiness development (Gautam, 2011).

Despite the importance of traditional plant-based remedies, there is a gap between traditional knowledge and modern healthcare practices that necessitates bridging (Malla et al., 2015). Addressing misconceptions surrounding the use of medicinal plants, particularly amidst the COVID-19 pandemic, is imperative (Khadka et al., 2021). Additionally, efforts are required to ensure the transfer of traditional medicinal knowledge to younger generations (Thapa, 2012). Knowledge of plant use among indigenous peoples is endangered due to waning interest among the younger generation, necessitating conservation efforts and further research (Hussain et al., 2018). The sustainable management of traditional medicines is essential because they constitute an integral part of local livelihoods and pharmacology (Kunwar et al., 2013).

Herbs have been integral to healing practices globally for centuries, with Nepal renowned for its Ayurvedic Jadibuti and aromatic plants, contributing significantly to its rich biodiversity (Manandhar, 1998). Traditional systems such as Ayurveda utilize herbs extensively, constituting a significant portion of Nepal's vascular flora (Bhattarai, 1997).

During the COVID-19 pandemic, there has been a resurgence in the use of medicinal plants, albeit accompanied by challenges and misconceptions (Khadka et al., 2021). However, there is a growing threat of the erosion of traditional remedies among younger generations, emphasizing the need for intergenerational knowledge transfer initiatives (Thapa, 2012). The ancient Sanskrit literature highlights the enduring relationship between humans and nature, underscoring the profound understanding of plant healing properties (Adhikari et al., 2019). The exploration and documentation of ethno botanic resources have emerged as critical endeavours for preserving ethno-medicinal knowledge and biodiversity (Kunwar et al., 2008). With elderly individuals and traditional healers holding a wealth of ethno-medicinal knowledge, their reluctance to share highlights the challenge of preserving this wisdom (Perera and Karawita, 2020). The younger generation's diminishing interest in traditional medicine and the lack of policies for its preservation signal a looming loss of invaluable indigenous knowledge (Shrestha and Dhillion, 2003).

The documentation of valuable plants and local traditional knowledge in Nepal is crucial for pharmacology and local livelihoods (Mahwasane et al., 2013; Kunwar et al., 2013). The use of neglected and underutilized plant species has the potential to enhance food security and alleviate poverty. Medicinal plants play a crucial role in treating illnesses, particularly in remote areas lacking modern health services, thus saving time and money (Miya et al., 2021). The conservation of these resources is imperative due to their potential for employment and revenue generation (IUCN, 2000). Global research should prioritize the cultivation and domestication of medicinal plants to exploit their potential (Salmerón-Manzano et al., 2020). The loss of traditional knowledge poses further risks to medicinal plant conservation (Kargiöglu et al., 2008; González-Tejero et al., 2008). Preserving the transmission of medicinal knowledge to future generations is vital (Acharya and Acharya, 2010; Ambu et al., 2020). This research aimed to document plant species used in traditional medicine practices within Panchase protected forests, highlighting their advantageous qualities and potential for socioeconomic improvement (Kunwar, 2007).

Ethnomedicinal knowledge plays a crucial role in maintaining the health and well-being of local communities in Nepal's Panchase protected forest. Recognizing the urgent need to preserve and validate traditional knowledge, this study's general objective is to investigate the scientific validity and potential for the development of these traditional remedies in modern medicine. Through specific objectives, this research also seeks to contribute to the preservation and documentation of traditional knowledge, validate traditional remedies, and identify new leads for drug discovery. Additionally, this study aims to contribute to the improvement of healthcare in communities that depend on traditional medicine, ultimately promoting the sustainable utilization of medicinal plants and enhancing the well-being of local populations.

Materials and Methods

Study Area

Panchase Forest, which covers an area of approximately 10-12 square kilometers, is located at the junction of three districts in West-Central Nepal: Kaski, Parbat, and Syangja (SGP, 2012) and connected to the boundary VDCs of the Kaski, Parbat, and Syangja districts as in figure 1. The Panchase forest ecosystem boasts abundant biodiversity, providing habitat for a range of endangered animals such as black bears and leopards, as well as hosting rare and unique plants such as orchids and rhododendrons (SGP, 2012). In this area, past studies have recorded a grand total of 613 species from 393 different genera and 111 different

families (Shrestha et al., 2019). Due to its religious site, tourism, and historical, ecological, and environmental significance, this protected forest is remarkable (Lensnp, 2019). On February 27, 2011, in accordance with article 23 of the Forest Act of 2002, the Panchase protected forest was gazette as a "protected forest" in appreciation of its extensive biodiversity, forest resources, cultural values, and religious significance (Suwal et al., 2013). Additionally, the PFE has a diverse range of endangered fauna (such as black bears and leopards) as well as rare and endemic plants (such as orchids and Rhododendron) (SGP, 2012).

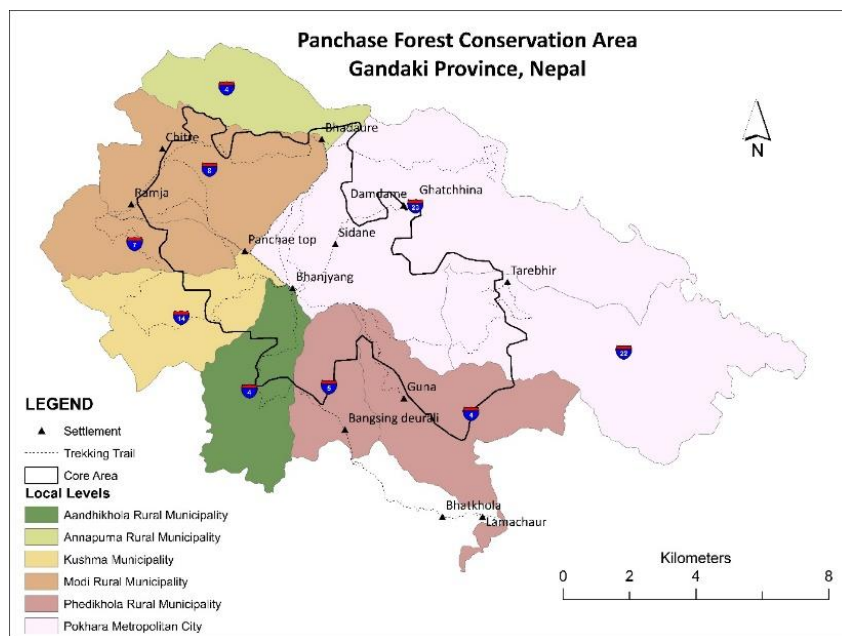


Figure 1. Administrative units in Panchase Protected Forest before restructuring (GoN/MoFSC, 2014)

Data collection

Primary Data Collection

A reconnaissance survey conducted with the assistance of locals, Division Forest Office (DFO) staff, and Federation of Community Forestry Users Nepal (FECOFUN) staff provided insight into people's perceptions of ethno-medicinal plants and nontimber forest products (NTFPs). Altogether, 20 key informant interviews were conducted with local healers, herbalists, community members, and forest officers to gather detailed information on traditional medicinal plant use (Perera and Karawita, 2020). Similarly, a total of 59 questionnaire surveys facilitated structured interviews, combining closed-ended questions with open-ended discussions to explore diverse perspectives (Brinkmann, 2014). Similarly, 7 Focus group discussions involved community members who were knowledgeable about traditional healing practices and who shared insights and beliefs on plant use for medicinal purposes. During the discussions, participants were encouraged to share their insights, personal experiences, and beliefs regarding the use of specific plants for medicinal purposes. Open-ended questions were asked to explore the participants' understanding of the properties of the plants, the parts used, the plants prepared and the ailments they were used to treat.

All the plant species were identified with the help of local people and herbalists. Herbarium of all species was prepared and stored in the Botany lab of Institute of Forestry,

Pokhara Campus which was later reviewed and confirmed by the team of botanist and silviculture experts.

Secondary Data Collection

A thorough analysis of ethno-medicinal records was carried out using published studies, NGO reports, and government offices to enrich understanding, with databases such as Scopus, Web of Science, and Google Scholar utilized for literature searches. Data analysis, including both qualitative and quantitative methods, was conducted to quantify plant use frequency and distribution, aided by GIS technology for mapping purposes. Additionally, the library catalogs of authorities that conducted ethno-medicinal research were searched for pertinent material. Further details regarding ethno-medicinal plants were obtained from the Panchase Protected Forest Program, Pokhara.

Results and Discussion

A total of 103 ethno-medicinal plants from 58 different families were recorded in the Panchase protected forest during the study, with Asteraceae being the dominant family with 8 species (Bano et al., 2017; Pandey and Ghimire, 2020; Meragiaw et al., 2021; Neupane et al., 2022). This conflicted with the findings of Shrestha et al. (2019), who reported that the dominant family was Orchidaceae (49 genera and 125 species), followed by Poaceae (25 spp.) and Asteraceae (25 spp.). Liliaceae was the second most dominant family, with 4 plants, and several other families had 3 or fewer ethno-medicinal plants. These findings underscore the importance of ethno-pharmacological research in discovering potential bioactive compounds in plants, offering promising avenues for the development of new antibacterial agents (Kunwar et al., 2008). The ethno-medicinal use of various plant parts, including leaves, fruits, roots, bark, and whole plant bodies, was documented. Figure 3 indicates the number of diseases treated with various plant parts. Among the 103 plants surveyed, leaves (35) were predominantly used for treating various ailments, including species such as Ghodtapre, Gheukumari, and Gandhe jhar. Fruits (24), such as Aalaichi, Kantakari, and Timur, are also commonly utilized. Additionally, the roots (16) and bark (15) of different plants were used for medicinal purposes. Whole plant bodies (11) of species such as Chiraito and Kalokuro were also utilized in various forms. The flowers, seeds, young shoots, latex, pseudo-bulbs, cloves, tubers, and rhizomes of different plants have also been reported to have medicinal properties.

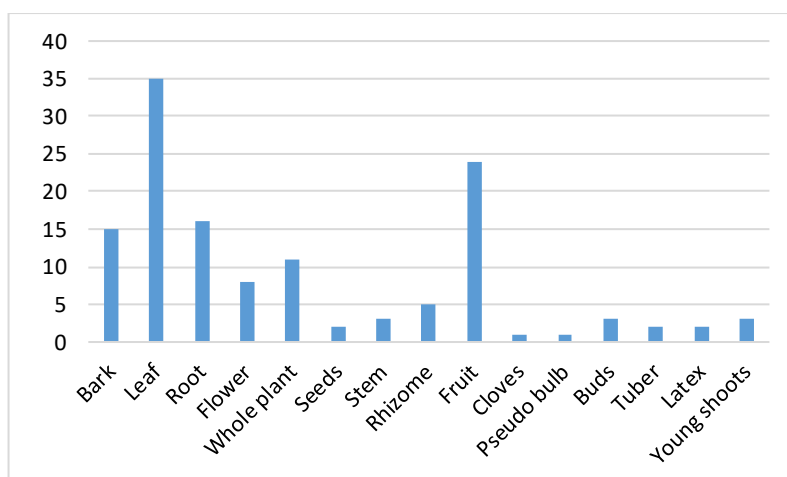


Figure 2. Graph showing the number of diseases treated with various plant parts.

After the study, we found a total of 15 plant parts are used for the treatment of various diseases and ailments as shown in figure 2. The most frequently utilized part was leaf to cure 35 diseases followed by the fruit for almost 24 diseases. Cloves and buds were used for the treatment of very few diseases along with seeds, tuber and latex.

Different plant species which are used to treat various diseases is shown in table 1. A substantial array of plant species (23) has been employed to address gastrointestinal issues such as gastric and intestinal swelling and pain, with leaves of Gheu kumari and fruits of Harro and Barro being commonly used for this purpose (Tamang, 2003; Sapkota, 2008; Uprety et al., 2011; Paudyal and Singh, 2014). Moreover, approximately 15 plant species, including fruits of Bhakiamilo and Mandro and the bark and leaves of Bhalayo and Tejpaat, have been utilized for treating diarrhea, dysentery, and cholera (Balami, 2004). Local remedies for cuts and wounds involved the leaves of Gandhe Jhar and Banmara, as well as the root of Buki phool and the fruit of Aangeri, while approximately 10 plant species were used for diuretic, tonic, and liver problems, such as the roots and stem of Kurilo and fruits of Amala, with Kurilo also known for its galactagogue properties (Sabnis et al., 1968; Subramonium and Puspangadan, 1999). For the common cold and cough, Simali leaves, the rhizome of Bojho, and the leaves of Buki phool, Asuro, and Tulsu were utilized, with Bojho also reported to be an important remedy for cold, cough, and throat sores (Singh et al., 2011). Leaves of Dhursul and Ghodtapre are commonly used for treating fever and migraine (Sapkota, 2008), while the bark of Hadchur is used for treating bone injuries, fractures, and back pain. Leaves of Khole saag, fruits of Pani amala, and whole trees of Chiraito were used for problems related to blood pressure and diabetes (Bhattarai, 2017). Pseudobuds of Sunakhari were utilized for removing scars and marks on the face, while buds of Rudilo were believed to alleviate anxiety, depression, and mental stress (Uprety et al., 2011). Koiralo flowers were used for treating ulcers and skin problems and for blood purification (Paudel, 2015), while Amba leaves were consumed during the COVID-19 pandemic and are believed to have curative effects. Numerous other ethno-medicinal plants have also been utilized for treating various diseases and disorders.

Table 1. Different plant species used to treat various diseases

Scientific Name	Family Name	Local Name	Parts Used	Ailments (Diseases)
<i>Achyranthes aspera</i> L.	Amaranthaceae	Datiwan	Whole plant	Plant is used to treat diuretic, toothache and asthma
<i>Achyranthus aspera</i>	Amaranthaceae	Apaamarga	Root	Useful in typhoid, Fever.
<i>Aconogonum molle</i>	Polygonaceae	Thotne	Young Shoots	It used to the skin to prevent minor abrasions from bleeding or as a cosmetic to make the skin look less greasy.
<i>Acorus calamus</i>	Araceae	Bojho	Rhizome	Cough

<i>Ageratum conyzoides</i>	Asteraceae	Gande	Leaf	Useful to stop bleedings from cuts and wounds.
<i>Aloe vera</i>	Asphodelaceae (Liliaceae)	Gheu Kumari	Leaf	Treatment of sunburn, burns, gastric
<i>Amomum aromaticum</i>	Zingiberaceae	Alainchi	Fruit	Ulcer Prevention, Beneficial for heart, oral, liver health.
<i>Anaphalis busua</i>	Asteraceae	Buki phul	Leaf, Flower	Useful to treat cough and cold.
<i>Anaphalis contorta</i>	Asteraceae	Buki Ful	Leaf, Root	Leaves to treat cough and Cold, Root is useful to trat cuts and wounds
<i>Artemesia indica Willd.</i>	Compositae	Titey Pati	Leaf	
<i>Artemisia dubia</i>	Asteraceae	Titepati	Leaf, Flower	Gastritis, pregnancy disease
<i>Artemisia indica</i>	Asteraceae	Titey Pati	Leaf	Useful to treat scabies, Reduces joint pain, Menstruation related problem in women
<i>Artocarpus lakoocha</i>	Moraceae	Badahar	Fruit	Useful in stomach ache
<i>Arundinaria falcata</i>	Gramineae	Nigalo	Young Shoots	Believed to have anticancer properties.
<i>Asparagus racemosus Willd.</i>	Liliaceae	Kurilo	Stem and Root	To regulate period, skin related problems, as well us helps in food digestion, Root is used as tonic and urinary problem.
<i>Azadirachta indica</i>	Meliaceae	Neem	Leaf	Used to treat fever and helps to purify blood.
<i>Bauhinia variegata L</i>	Fabaceae	Koiralo	Fruit	Helps in blood filtration
<i>Bauhinia variegate</i>	Fabaceae	Koiralo	Flower	Treatment of skin ailments, ulcers, gastrointestinal disease

<i>Berberis aristata. var. micrantha</i>	Berberidaceae	Chutro	Root/Bark	The plant has beneficial properties that include antipyretic, antibacterial, antimicrobial, anticancer and antioxidant. Root bark is used to treat eye disease externally.
<i>Berberis napaulensis (DC .)</i>	Berberidaceae	Jamunay Mandro	Fruit	Useful in the treatment of dysentery.
<i>Bergenia ciliata</i>	Saxifragaceae	Pakhanbed	Rhizome	Women womb related problems, cold, cough, diarrhea, etc.
<i>Bidens pilosa</i>	Asteraceae	Kalokuro	Whole plant	Useful to treat cuts.
<i>Blumea lacera</i>	Asteraceae	Gandhe jhar	Leaf	Cuts
<i>Boehmeria platyphylla</i>	Urticaceae	Kamle	Root	Useful in stopping bleeding from cuts.
<i>Bombax ceiba L.</i>	Leguminosae	Simal	Fruit, Bark	Bark Juice is used to treat urinary disorder, excessive heat in the body.
<i>Brassaiopsis hainla</i>	Araliaceae	Seto Chuletro	Fruit	Helpful in joint pain
<i>Centella asiatica</i>	Apiaceae	Ghodtapre	Leaf	Fever (Consuming 5 leaves), Acidity, urinary problem (stopped urination)
<i>Cheilanthes albomarginata C.B. Clark</i>	Pteridaceae	Dankerno	Leaf	The juice from leaf is used to treat stomach pain.
<i>Cheilocostus speciosus</i>	Costaceae	Betlauri	Rhizome	Useful to treat Fever, intestinal worm and rash.
<i>Cinnamomum tamala (Buch. - Ham.) Nees & Eberm</i>	Lauraceae	Tej Pat	Leaf, Bark	Leaves are used to treat Dysentery, stomachache and digestion

<i>Cirsium verutum</i>	Compositae	Thakal	Root, Flower, Leaf	Treatment of liver ailments, skin disorder and digestive issues.
<i>Cissampelos pareira</i>	Menispermaceae	Batulpate	Leaf	Useful in urine burn
<i>Cleistocalyx operculatus</i>	Myrtaceae	Kyamuno	Bark	The Bark is used to treat cough and throat related problems
<i>Coccinia grandis</i>	Cucurbitaceae	Golkakri	Fruit	Useful for skin diseases, Cough and helpful for epilepsy patient.
<i>Colebrookea oppositifolia</i>	Lamiaceae	Dhursul	Leaf	Useful for headache and Fever
<i>Curcuma angustifolia</i> Roxb.	Zingiberaceae	Kalo haledo	Rhizome	Stomach problem and gastric
<i>Cuscuta reflexa</i>	Convolvulaceae	Aakasbeli/ Amarbel	Stem, seed	Useful in constipation, diarrhea, itching, etc.
<i>Cynodon dactylon</i> (L.) Pers	Poaceae	Dubo	Entire plant	Plant is used to treat cuts and wounds, also heals heat affected area.
<i>Dactylorhiza hatagirea</i> (D. don)	Orchidaceae	Panch Aaule	Whole plant	Multipurpose (Tuber can be used as a tonic, Roots are useful in treatment of inflammation of the gums and teeth, etc.)
<i>Dendrocalamus hemiltonii</i> Gamble	Poaceae	Baans	Young Stem	Useful to reduce joint pain also helpful to treat indigestion, constipation and diarrhea.
<i>Dioscorea deltoidea</i> Wall. ex Griseb	Dioscoreaceae	Gittha	Fruit	Boiled fruits; good for stomach ache
<i>Dioscorea hamiltonii</i> Hook. f.	Dioscoreaceae	Ban Tarul	Tuber	Improve the function of digestive system and helps in weight loss.
<i>Disporum cantoniense</i> (Lour.) Merr.	Liliaceae	Kukurdaino	Buds	For eye related problems, Digestive system

<i>Drymaria cordata L</i>	Caryophyllaceae	Abijalo	Root	Useful in backache
<i>Eclipta prostrata</i>	Asteraceae	Bhringiraj	Leaf	Cuts, scabies
<i>Emblica officinalis</i>	Phyllanthaceae	Amla	Fruit	Constituent of Triphala, useful in gastro-intestinal disorders, headache
<i>Eupatorium adenophorum Spreng</i>	Compositae	Banmara	Leaf	The Juice from the leaf is helpful in treating cuts and wounds
<i>Euphorbia royleana</i>	Euphorbiaceae	Siudi	Latex	Latex is used in paining part, used to stop bleeding, etc.
<i>Eurya acuminata</i>	Theaceae	Jhingaane	Leaf	Diarrhea, cholera, dysentery, cuts and wounds
<i>Falconeria insignis Royle</i>	Euphorbiaceae	Khirro	Bark, Flower	Flowers are used to regulate menstrual disorders, irregular periods and Bark is helpful to treat various digestive issues.
<i>Ficus auriculata</i>	Moraceae	Timila	Fruit	Useful in dysentery
<i>Ficus plamata</i>	Moraceae	Bedulo	Latex	Useful in order to remove thorns from flesh
<i>Garuga pinnata</i>	Burseraceae	Dabadabe	Root, Bark	Root is useful for skin diseases. Bark is useful for stomach disorder.
<i>Ilex dipyrena wall</i>	Aquifoliaceae	Liso	Whole plant	Intestinal disease, burns, swelling, etc.
<i>Justicia adhatoda</i>	Acanthaceae	Asuro	Bark, Leaf, Root, Flower	Cough, Cold, Asthma
<i>Lilium nepalense</i>	Liliaceae	Ban Lasun/Had ey Lasun	Cloves	Nose Allergy, Tonsil, Wound inside mouth
<i>Lindera neesiana (Wallich ex Nees)Kurz</i>	Lauraceae	SilTimur	Fruit	It is useful in the treatment of various ailments including digestive disorders,

				respiratory conditions and joint pain.
<i>Litsea monopetala</i>	Lauraceae	Kutmiro	Leaf, Bark	Joint Pains, Bark is useful to treat typhoid.
<i>Lobelia pyramidalis</i>	Campanulaceae	Ekleybir	Leaf	Useful for pneumonia, cold and cough.
<i>Lycopodium clavutum</i>	Lycopodiaceae	Nagbeli	Leaf	Useful for Diabetic patients
<i>Lyonia ovalifolia</i>	Ericaceae	Angeri	Fruit	Scabies, Wounds, Burns
<i>Maesa chisia</i>	Myrsinaceae	Bilaune	Leaf	Useful to treat scabies.
<i>Mimosa pudica L.</i>	Fabaceae	Lajawati jhar	Entire Plant	Plant is used to treat diarrhea, dysentery and leucorrhea
<i>Mussaendra roxburghii L.</i>	Rubiaceae	Dhobini	Bud, Root	Useful in skin infection, jaundice, cough, etc.
<i>Myrica esculenta</i>	Myricaceae	Kaphal	Fruit	Useful in the treatment of fever, diarrhea, cough, etc.
<i>Myrica esculenta</i>	Myricaceae	Kafal	Fruit, bark	Useful in dysentery
<i>Nephrolepis cordifolia</i>	Nephrolepidaceae	Pani Amla	Fruit	Used to cure the sugar, gastric, high blood pressure, constipation, etc.
<i>Orchid sp</i>	Orchidaceae	Sunakhari	Pseudobulb	The paste of the pseudobulb is used to clear scars and marks in face.
<i>Oxalis corniculata L.</i>	Oxalidiaceae	Chariamilo	Whole Plant	Useful in heart related problems.
<i>Parispolyphylla</i>	Liliaceae	Satuwa	Root, Rhizome	Helps in pain relief, roots and rhizomes can be combined to treat dangerous snakebites, bug bites, and boils.
<i>Persicaria barbata</i>	Polygonaceae	Pirejhar	Leaf, Root	Useful in skin related problems, also useful to treat scabies.

<i>Piper peepuloides</i>	Piperaceae	Rari	Fruit	Helpful in stomach related problems
<i>Pogostemon amarantoides</i>	Lamiaceae	Rudilo	Bud	It is used for its aromatic properties, promoting relaxation and relieving anxiety.
<i>Potentilla fulgens Wall. ex Hock</i>	Rosaceae	Bajradanti	Root	Useful to treat joint swelling, inflammation and redness.
<i>Prunus cersoides D.Don</i>	Rosaceae	Paiyun	Leaf, Bark, Root	Used to treat digestive disorder, reliving respiratory symptoms and providing pain relief.
<i>Psidium guajava L</i>	Myrtaceae	Ambaa	Leaf	Boiled leave in water relives stomach pain/In recent days many people find it useful for COVID
<i>Remusatia vivipara</i>	Araceae	Jaluko	Leaf	Useful in treatment of arthritis and Inflammation
<i>Rhododendron arboretum</i>	Ericaceae	Laligurans	Flower	To clear out the throat specially when fish throne gets inside
<i>Rhus javanica</i>	Anacardiaceae	Bhakimlo	Fruit	Diarrhea
<i>Rhus javanica</i>	Anacardiaceae	Bhaki amilo	Fruits, Bark, Leaf	Colic, bark in dysentery
<i>Rorippa nasturtium-aquaticum.</i>	Cruciferae	Khole Sag	Leaf	Helpful in reducing blood pressure.
<i>Rubia manjith</i>	Rubiaceae	Majitho	Root	The plant is also used against blood dysentery, inflammations, and Urino-genital disorders
<i>Rubusa ellipticus</i>	Rosaceae	Aauseloo	Fruit, Stem	Helps in digestion, useful for cough and cold.
<i>Rumex nepalensis Spreng</i>	Polygonaceae	Halhaley Saag	Leaf	Leaf is used to treat cuts, wounds, joint pains and swellings

<i>Semecarpus anacardium</i>	Anacardiaceae	Bhalayo	Seeds, Bark	Helpful for digestive system.
<i>Solanum virginianum</i>	Solanaceae	Kantakari	Fruit	Dental Problem, useful for diabetic patients
<i>Swertia chirayita</i>	Gentianaceae	Titey (Chiraito)	Whole tree	Useful For High Blood pressure, Migraine, Liver Problem
<i>Syzygium cuminii</i>	Myrtaceae	Jamun	Bark	Useful for Diarrhea and dysentery
<i>Taxus wallichiana</i>	Taxaceae	Loth Sallo (Surlung)	Leaf and Bark	Helpful in the treatment of Breast Cancer/Production of Taxol
<i>Tectaria coadunata</i> (Wall. ex. J. Sm.) C.Ch	Dryopteridaceae	Kalo Niuro	Whole plant	Decrease body pain, help in digestion
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Barro	Fruit	Fruit used to remedy cough and eye disease one of the constituents of triphala.
<i>Terminalia chebula</i>	Combretaceae	Harro	Fruit	The fruit is one of the constituents of triphala that is used for gastritis.
<i>Termitomyces eurhizus</i>	Tricholomataceae	Kaney Chyau	Leaf	Digestive System, Useful for Diabetic patients
<i>Tinospora sinensis</i>	Menispermaceae	Gurjo	Whole plant	Rumex nepalensis Spreng
<i>Tribulus terrestris</i>	Zygophyllaceae	Gokhur	Fruit and Root	Chest Pain, Heart Problems
<i>Tribulus terrestris</i> L., Zygophyllaceae	Zygophyllaceae	Gaikhurey	Tuber	Gastric, Constipation
<i>Urtica dioica</i>	Urticaceae	Chalney Sisno	Leaf	Used to detoxify the body also to improve metabolic efficiency
<i>Viscum album</i>	Orchidaceae	Harchur	Whole plant	Plastering hand leg fracture

<i>Viscum album L.</i>	Loranthaceae	Hadchur	Bark	Bark is used to treat bone fracture and backbone problem
<i>Vitex negundo</i>	Lamiaceae	Simali	Leaf	Useful in treatment could cough and Fever
<i>Woodfordia fruticose</i>	Lythraceae	Dhairo	Flowers	Useful in treating and managing diarrhea, bleeding issues, wounds, nasal and rectum bleeding, etc.
<i>Zanthoxylum armatum DC.</i>	Rutaceae	Aakhey Timur	Fruit	Improves digestive system, Additionally, relives swollen stomach.

From the study, we identified a more than 50 diseases, disorders or ailments, which were noted as 39 different diseases which is represented in Table 2. We found that most number of plants (23) were used for the treatment of gastro-intestinal problems followed by diarrhea, dysentery and cholera with 15 plant species being used as medicine. Cuts and wounds, diuretic, tonic and liver problems, cough and cold, skin ailments and so on were recorded.

Table 2. Number of plant species used for the treatment of diseases

Diseases, disorders and ailments	Number of plants
Acidity	2
Anxiety	2
Asthma and Chest problems	3
Bleeding problems	3
Blood pressure problems	6
Body pain and ache	7
Burns	4
Cancer	3
Constipation	5
Cough and cold	9
COVID-19	1
Cuts and wounds	12
Diabetic ailments	4
Diarrhea, dysentery and cholera	15

Diuretic, tonic and liver problems	10
Eye related problems	3
Fever and Migraine	7
Fracture and plaster	2
Gastro-Intestinal problems	23
Headache	3
Heart stroke	1
Heat stroke	2
Itching and Rashes	2
Jaundice	2
Joints pain	6
Menstruation disorders	3
Nose ailments	2
Pneumonia	2
Scabies	5
Scars and marks	1
Skin ailments	8
Snakebite	1
Stomach-ache	3
Swelling and inflammation	7
Tonsil and throat sore	3
Tooth and Gums	5
Typhoid	3
Ulcer	2
Urino-genital disorders	6

Conclusion

This study demonstrated that the home herbal cure is a distinct, Ayurvedic-influenced health care system in the Panchase area. The communities of the Panchase area are undergoing significant changes in their way of life, similar to those experienced by other indigenous communities around the world. However, medicinal plants continue to play a large part in their daily lives. Pharmacological research indicates that medicinal plants have significant potential for treating a wide array of serious and long-term illnesses. Our

investigation revealed 103 species of medicinal plants from 58 different families that are utilized for treating 57 various diseases or health issues. These plants are often used in their entirety or specific parts of their structure, with leaves being the most commonly used for treatment across multiple ailments. Within the Panchase protected forest, the Asteraceae family emerged as the predominant source of ethno-medicinal plants.

The development of novel medications is based on an understanding of ethnomedicine. It is important to properly document traditional knowledge on medicinal plants, including their cultivation and identification, to conserve both traditional knowledge and therapeutic plants. It is important to record and transmit a variety of ethnic and indigenous knowledge on plant species, their identification, collection techniques, and disease treatments from generation to generation. The next generation needs to be inspired and educated about traditional medicine. To scientifically confirm the medicinal properties of plants used by indigenous groups, researchers need to conduct phytochemical and pharmacological studies. To reduce pressure on these plants in their natural environment, it is necessary to cultivate them commercially. Additionally, preserving and integrating traditional tribal knowledge about medicinal plants and their effects could enhance the study and application of herbal medicine.

Recommendations

Improved cultivation practices for economically viable ethno-botanical species should be fostered in communities through capacity training, timely policy intervention, and strong market linkages. This will assure income production, improved livelihoods, and ultimately the conservation of these species. The pharmacological and phytochemical properties of therapeutic plants should be investigated, and the findings should be applied to upcoming medical projects. Detailed studies regarding the seasonality of ethno-medicine, treatment procedures, medicinal properties and their conservation as well as management status should be conducted in Panchase protected forests.

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