Ethnomedicinal uses of Boerhavia diffusa among indigenous communities in the Indian Subcontinent

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Review

Abstract

Background: Plants and their derivatives have been used to address various human health issues since ancient times. Indigenous communities are the main source of knowledge regarding these plants, and scientific validation is often required for their medicinal uses. *Boerhavia diffusa* L., commonly known as punarnava or spreading hogweed, is a valuable medicinal herb with numerous pharmacological advantages. Recognized in Ayurvedic medicine as a rejuvenator or "Rasayan," it is noted for its impressive anti-aging and antioxidant effects. The purpose of this study was to gather recent information on the ethnomedical uses of *Boerhavia diffusa* L. to explore diverse therapeutic applications and determine any potential pharmacological benefits.

Methods: Relevant data on the ethnomedical uses of *Boerhavia diffusa* L. and its parts—root, leaf, stem, entire plant, flower, and seed—was gathered from books, articles, theses, and patents that were published in online databases like Google Scholar, PubMed, Science Direct, SciELO, and SpringerLink, among others. Ethnobotanical indices have been utilized to verify the authenticity of the gathered information.

Results: The literature review reveals that boeravinone, a rotenoid found in the roots and leaves of the medicinal plant, is one of its active compounds. The plant contains a range of active substances, which include purine nucleosides, lignans, xanthones, alkaloids, flavonoids, phytosterols, and steroids. In the Indian subcontinent, indigenous communities and local healers utilize the plant and its components, primarily the roots, followed by the leaves and whole plant, to address jaundice, kidney issues, digestive disorders, heart problems, asthma, eye conditions, urinary issues, and anemia, in addition to forty-six other health concerns.

Conclusion: The findings indicated that *B. diffusa* has various ethnobotanical uses within ethnic groups in the Indian subcontinent, highlighting the need for focused efforts to optimize its benefits and applications. To accurately identify the specific functions of its bioactive components for multiple pharmacological purposes, additional clinical trials and further research are necessary for its diverse therapeutic applications.

Keywords: Boerhavia diffusa, Traditional medicine, Folklore uses, Indian sub-continent

Background

Boerhavia diffusa, a member of the Nyctaginaceae family, is an important plant that is categorized as a rasayana according to Ayurvedic traditions. This species typically grows in warm tropical and subtropical regions worldwide, especially in the Asia-Pacific, Africa, the Caribbean, and both South and North America (Nair *et al.* 2019). Historical Ayurvedic references to the plant's parts are noted in the Charaka Samhita and Sushruta Samhita, which has been supported by various research studies (Murti *et al.* 2010; Dora *et al.* 2015). Among the 40 species in the *Boerhavia* genus, six occur in India (Chopra, 1969). B. diffusa is the most prevalent species throughout India and holds considerable medicinal importance. Besides its many therapeutic applications, the plant is also eaten as a nutritious vegetable in certain regions (Pandey *et al.* 2019).

The plant is a creeping perennial herb adorned with pink flowers and is commonly found as a weed in India (Fig. 1). Known as Punarnava, it is considered a body rejuvenator and renovator, possessing life-enhancing and anti-aging properties (Wahi *et al.* 1997, Mishra *et al.* 2014). Traditional medicine utilizes the therapeutic aspects of the plant's roots, leaves, and seeds to address various human health issues. In the summer, the mature root stock becomes dormant but reappears when the rain arrives. Due to its remarkable attributes, Punarnava is a well-regarded "rasayan," known for enhancing immunity, revitalizing youth, and strengthening both body and mind. The primary components of this plant include the rotenoids boeravinone B, C, and E, along with flavonoids, lignans, xanthones, steroids, purine nucleosides, phenolic compounds, terpenes, phenylpropanoids, indole compounds, norisoprenoids, and organic acids (Lami *et al.* 1990; Ferreres *et al.* 2005; Douglas and Manos 2007; Pereira *et al.* 2009; Bhope *et al.* 2011; Bhope *et al.* 2013). The plant exhibits a variety of pharmacological characteristics, including antibacterial, anticancer, hepatoprotective, hypoglycemic, antiproliferative, anti-inflammatory, antiestrogenic, antinociceptive, immunomodulatory, and anticonvulsant effects (Rawat *et al.* 1997; Murti *et al.* 2010; Gunaseelan *et al.* 2022).

Figure 1. *B. diffusa plant:* Natural habitat, Root, Leaves, Stem, Flower and Fruits

According to Ghosh and Rai (2018), this herb has been traditionally utilized for various ethnobotanical purposes across different regions of India. The leaves are eaten as vegetables, while the roots are employed to treat conditions like rheumatism, leukorrhea, asthma, encephalitis, and urinary issues. An ethnobotanical survey by Patil and Baisane (2024) highlighted the plant's importance in the healing practices of various Indian communities. Ethnobotanical knowledge of medicinal plants is necessary for scientific research to develop a long-term plan (Pandey, 2018). Moreover, it is important to

have ethnobotanical information regarding the plant's parts, preparation methods, and their uses by local populations (Kumar and Pandey 2015). The herb possesses such diverse and beneficial medicinal qualities that it has the potential to serve as a remedy for numerous contemporary health issues. Therefore, extensive research on this herb could greatly benefit humanity, especially the ethnic communities. This article aims to compile the latest information on the therapeutic importance of this herb for a variety of health benefits to substantiate and endorse its ethnomedicinal relevance.

Materials and Methods

Analysing published ethnomedical literature

This study reviews the research conducted on *Boerhavia* medicinal plants from 1980 to 2025. To compile relevant review and research data, articles, books, and theses published in various sources including Scopus, Web of Science, ScienceDirect, Academia.edu, ResearchGate, Semantic Scholar, iMedPub, EBSCO, Sci-Hub, SciFinder, Publons, and PubMed were examined, focusing on pharmacopoeias. The search criteria encompassed all English-language literature pertinent to the study's exploration of the herb's ethnomedicinal uses by traditional communities and local healers in India. To find the published ethnomedical literature using specialized search engines and websites, keywords such as "ethnomedicine," "*Boerhavia diffusa*," and "Indian tribes" were used. The emphasis was placed on literature that describes the medicinal uses of *B. diffusa*'s stems, roots, leaves, fruit, and flowers by various ethnic groups throughout India. Furthermore, data regarding the native species of the Nyctagenaceae family and the chemical properties of *B. diffusa* plants was gathered from botanical databases including the USDA (U.S. Department of Agriculture) Plants Database, eFlora of India, OSADHI (Online Structural and Analytics-based Database for Herbs of India), CABI Compendium, and Plants of the World Online.

Authentication of ethnobotanical data

The data was organized to conduct a quantitative analysis of ethnobotany of the herb. The subsequent ethnobotanical indices were utilized to validate the gathered information.

Plant Part Value (PPV)

In order to assess the importance of each plant component used by the local communities and healers, the plant part value (PPV) was calculated. The plant part value (PPV) was determined using the formula provided by Chaachouay *et al.* (2019):

$$PPV = RUpp/RU$$

where

RUpp= the total number of uses of any plant part of the medicinal plant

RU= the total number of uses for all of its parts

Fidelity Level (FL)

The healing potential of a medicinal plant is assessed using Fidelity Level (FL) values, which reflect the percentage of informants who acknowledge that the plant can be used to address specific ailments (Friedman et al., 1986). This method has been utilized to suggest that a particular medicinal plant species may possess effectiveness and that its bioactive properties and therapeutic benefits warrant further investigation. Based on the gathered information, the following formula was applied to calculate the fidelity level (FL) of *B. diffusa* for different ailments.

$$FL\% = Np / N \times 100$$

where,

Np= the number of informants who recommended the plant for a specific ailment.

N= total number of informants who recommended the plant for any ailment.

Results

Traditional uses of *B. diffusa*

As reported in available literature, the primary parts utilized by various ethnic groups, traditional healers, and local communities in the Indian subcontinent for addressing approximately 54 ailments are the roots, followed by leaves and whole plants (Table 1). Jaundice is the most frequently treated condition with *B. diffusa*, exhibiting a Fidelity Level of 11.34% (Table 2). The root is the predominant part employed, prepared in forms such as paste, decoction, or powder by numerous communities throughout India, including the ethnic groups in Bastar Madhya Pradesh, the Jaunsari tribe from Uttarakhand, traditional users in Villupuram, Tamil Nadu, as well as local populations in Vellore and the Rajgond Tribe in Haladkeri Village, Bidar, Karnataka (Fig. 2 a). Leaves are also utilized, often in the form of extracts, juice, or powdered variants, primarily by the

Kurichiyas, Kurumas, and Paniyas tribes of Wayanad, Kerala, as well as by tribal communities and local healers in Chatara, Sonebhadra, Uttar Pradesh, and tribes from Kuarmunda Block, Sundergarh, Odisha (Fig. 2 b). Furthermore, inhabitants of the Satpura Plateau in Central India, the Bankura district in West Bengal, locals and traditional healers in Mahendergarh, Haryana, villagers and local practitioners in Ranchi, Jharkhand, tribes from Kuarmunda Block in Sundergarh, Odisha, and the Bhil, Gond, and Sahariyas tribes, along with rural communities in Guna, Madhya Pradesh use decoctions, extracts, powders, and juice of the whole plant to address jaundice (Fig. 2 c) (Table 1).

The research indicated that the herb with a 7.80% Fidelity Level is effective in addressing kidney issues (Table 2). The root serves as the primary component utilized by numerous Indian groups, including the indigenous populations of Jorbeer Conservation Reserve in Bikaner, Rajasthan; the Irular tribes of Nilgiri in Tamil Nadu; the local inhabitants of Muzaffarnagar, Uttar Pradesh; and the residents of Kapurthala, Punjab (Fig. 2 a). To manage kidney ailments, certain tribes in Jashpur, Chhattisgarh; the Irular tribes of Nilgiri, Tamil Nadu; the local communities of Kapurthala, Punjab; the indigenous groups in Jorbeer Conservation Reserve, Bikaner, Rajasthan; and the ethnic communities in the Barjala region of West Tripura commonly employ leaves in the form of extract, powder, or juice (Fig. 2 b). Moreover, the tribes from Kuarmunda Block in Sundergarh, Odisha, as well as the indigenous communities around Gandhamardan Mountain in Bargarh, Odisha, often utilize the whole plant as powder, paste, infusions, and juice primarily for treating kidney disorders (Fig. 2 c) (Table 1).

The available literature suggests that B. diffusa is often utilized to address gastrointestinal issues, with a fidelity rate of 7.09% (Table 2). Numerous Indian communities, such as the Bhil tribes located in Jhabua Madhya Pradesh, rural populations and traditional users in Satna Madhya Pradesh and Villupuram Tamil Nadu, traditional healers from Mahendergarh Haryana, tribes in Shahdol Madhya Pradesh, and Hukumpeta Mandal in Alluri Sitaramaraju Andhra Pradesh, as well as indigenous groups in the Jorbeer Conservation Reserve Bikaner, Rajasthan, utilize the root in the form of paste, decoction, extract, and juice to manage stomach problems (Fig. 2 a) (Table 1). Furthermore, the Irular, Mudugar, Dhodugar, and Kurumbar tribes of Attappady tehsil Palakkad, Kerala, herbalists from Anantagiri and Dhamagundam forest in Vikarabad, Telangana, and rural communities in Tranquebar, Tamil Nadu, commonly use the leaves as extracts, juices, or in cooked dishes to address stomach disorders (Fig. 2 b) (Table 2). Additionally, the Irula tribes of Hasanur Hills Erode, Tamil Nadu; tribal communities in Mananthavady Bathery and Vythiri taluka Wayanad, Kerala; local practitioners in Ranchi, Jharkhand; and the tribes in Kuarmunda Block, Sundergarh, Odisha, employ the whole plant in the form of paste, juice, and powder to treat stomach ailments (Fig. 2 c) (Table 1).

The research also revealed that traditional communities across the Indian subcontinent utilize the root, leaves, and whole plant in various forms such as paste, decoction, juice, extract, powder, tender, or cooked, to address heart ailments, bronchitis, and asthma, as well as eye issues, skin disorders, urinary troubles, and anemia. Additionally, local populations use *B. diffusa* to treat snake bites, diabetes, liver ailments, dropsy, fevers, coughs, leucorrhea, cuts and wounds, purify blood, and relieve stomach pain.

Uses of other plant parts and mode of administration

According to the referenced studies, various ethnic groups within the Indian subcontinent have utilized shoots, flowers, and seeds to address a range of health issues. In northeast Gujarat, tribal communities make use of tender shoots (Punjani 2010), while the population in the Vindhya region of Madhya Pradesh employs bark decoctions (Mishra 2015) to alleviate urinary problems. The tribes residing in the Kuarmunda Block of Sundergarh, Odisha, treat vomiting by combining stem powder with giloy (Tinospora cordifolia) and tulsi (Ocimum gratissimum) (Bagartee and Choudhury 2020). The Banraji community located in Kumaun, Uttarakhand, uses flower extracts from plants to address cataracts (Bisht and Adhikari 2018). In Bhiwani, Haryana, a tribal group applies seed extracts and powders for the treatment of fever, constipation, anaemia, cardiac issues, urinary infections, stones, lumbar pain, skin ailments, leucorrhea, and dyspepsia (Singh et al. 2015) (Fig. 2 d) (Table 1).

Table 1. Uses of various parts of *B. diffusa* and mode of administration for treating various ailments by ethnic communities in Indian subcontinent

Ailment treated	Mode of preparation and treatment methods	Communities/ Localities
Root		
Stomach disorders	Paste given in empty stomach	Bhil tribes of Jhabua Madhya Pradesh (Maheshwari *et al*. 1986)
	Decoction	Rural communities in Satna Madhya Pradesh (Dwivedi *et al*. 2006)
	Decoction	Traditional users Villupuram, Tamil Nadu (Sankaranarayanan *et al*. 2010)
	NR	Khondus tribes, Munchingiputtu Mandal, Visakhapatnam, Andhra Pradesh (Padal *et al.* 2012)
	Extract	Local people and traditional healers, Mahendergarh district, Haryana (Yadav and Bhandoria, 2013)
	Paste given in empty stomach	Tribal communities Shahdol, Madhya Pradesh (Bharti 2015)
	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.,* 2015)
	NR	Tribes of Hukumpeta Mandal, Alluri Sitaramaraju, Andhra Pradesh (Varma *et al*. 2023);
	Juice	Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain 2024)
Kidney disorders	Decoction	Tribal women, Madhya Pradesh (Sahu 1982)
	Decoction	Local communities Muzaffarnagar, Uttar Pradesh (Prachi *et al*. 2009)
	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015)
	NR	Malayali tribes, Jawadhu hills, Thiruvannamalai, Tamil Nadu (Prabu and Madhavan, 2016)
	Powder	Irular Tribes, Nilgiri District, Tamilnadu (Panneer Selvam *et al.* 2017)
	Paste	Traditional practitioner, Tripura (Roy and Datta, 2019)
	NR	Bhil, Gond, Sahariyas tribes and rural community, Guna district, Madhya Pradesh (Samar *et al.* 2020)
	Decoction	Local inhabitants, Kapurthala, Punjab (Kaur *et al.* 2020)
	Juice	Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Asthama	Paste mixed with ginger and 2 pepper	Danga forest, West Dinajpur, West Bengal (Sur *et al*. 1987)
	Decoction	Jaunsari tribe, Garhwal Himalaya, Uttarakhand (Bhatt and Negi, 2006)
	Juice	Traditional healers (Natuvaidyulu), Andhra Pradesh (Savithramma *et al.* 2007)
	Pounded and consumed	Traditional healers, different ethnic groups, Assam (Nath *et al*. 2008)
	Extract	Gujjar-Bakerwal tribes of Jammu and Kashmir (Rashid 2013)
	Extract	Traditional healers in Shobanapuram village, Pachamalai Hill, Tamilnadu (Gritto *et al*. 2015)
	Decoction	Indigenous communities, Chamba district, Himachal Pradesh (Sharma *et al*. 2018)
	Extract	Traditional medicines farmers, Uttarakhand (Ravikant *et al*. 2022)
	Root mixed with turmeric powder	Indigenous communities of Gandhamardan Mountain Bargarh, Odisha (Pandey *et al*. 2024)
Heart diseases	Decoction	Tribal women, Madhya Pradesh (Sahu 1982)
	Powder	Tribes of Amarakantak, Shahdol (Kumar *et al*. 2004)
	NR	Valmiki tribes, Munchingiputtu Mandal, Visakhapatnam, Andhra Pradesh (Padal *et al*. 2012)
	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015)

	Powder Mixed With Honey Or Milk	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)
	Infusion	Tribal people in Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
	NR	Bhil, Gond, Sahariyas tribes and rural community, Guna district, Madhya Pradesh (Samar *et al.* 2020)
Urinary disorder	Decoction,	Tribal community, North east Gujarat, India(Punjani 2010
	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015)
Gall stone	Decoction	Local inhabitants, Kapurthala, Punjab (Kaur *et al.* 2020)
Dropsy	Decoction	Tribal women, Madhya Pradesh (Sahu 1982)
	Paste	Local community Tapkeshwari Hill, Bhuj, Kachchh, Gujarat (Patel *et al*. 2010)
	Extract	Traditional healers in Shobanapuram village, Pachamalai Hill, Tamilnadu (Gritto *et al*. 2015)
	NR	Bhil, Gond, Sahariyas tribes and rural community, Guna district, Madhya Pradesh (Samar *et al.* 2020)
	Juice	Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Gonorrhoea	Decoction	Tribal women, Madhya Pradesh (Sahu 1982)
	NR	Bhil, Gond, Sahariyas tribes and rural community, Guna district, Madhya Pradesh (Samar *et al.* 2020)
Leg oedema	Decoction	Tribes Nandurbar Maharastra (Tayade and Patil, 2006)
Eye diseases	Decoction	Jaunsari tribe, Garhwal Himalaya, Uttarakhand (Bhatt and Negi, 2006)
	Paste,	Ethnic communities Nandurbar Maharastra (Tayade and Patil, 2006)
	Powder,	Rural populations, Churu Thar desert, Rajasthan (Parveen *et al*. 2007)
	Decoction	Tribes of Rewa Madhya Pradesh (Shukla *et al*. 2010)
	Paste	Tribal people of Kuarmunda Block in Sundergarh, Odisha (Bagartee and Choudhury, 2020)
	Extract	Traditional medicines farmers, Uttarakhand (Ravikant *et al*. 2022)
	Powder mixed with honey	Local populations Kotdwara-Bhabhar Range Uttarakhand (Rawat 2023)
	Juice	Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Jaundice	Paste	Ethnic communities Bastar Madhya Pradesh (Sharma and Chandra, 1998)
	Decoction	Jaunsari tribe, Garhwal Himalaya, Uttarakhand (Bhatt and Negi, 2006)
	Decoction	Traditional users Villupuram, Tamil Nadu (Sankaranarayanan *et al*. 2010)
	Decoction	Local community Vellore, Tamil Nadu (Thirumalai *et al*. 2010)
	Powder taken with honey	Rajgond Tribe, Haladkeri Village, Bidar District, Karnataka (Suryawanshi and Vidyasagar *,* 2015)
	NR	Malayali tribes, Jawadhu hills, Thiruvannamalai, Tamil Nadu (Prabu and Madhavan, 2016)
	Powder Mixed With Honey Or Milk	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)
	NR	Local communities, Malshiras Tehsil Solapur, Maharashtra (Aiwale *et al*. 2022)
	Extract	Traditional medicines farmers, Uttarakhand (Ravikant *et al*. 2022)
	Paste and Powder	Traditional healers of Malayali tribes, Bodamalai Hills, Namakkal district, Tamil Nadu (Nigesh *et al*. 2025)
Abdominal pain	Decoction	Traditional users Villupuram, Tamil Nadu (Sankaranarayanan *et al*. 2010)
	Powder taken with honey	Rajgond Tribe, Haladkeri Village, Bidar District, Karnataka (Suryawanshi and Vidyasagar *,* 2015)
	Powder mixed with honey or milk	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)

Spleen enlargement and anti-stress	Decoction	Traditional users Villupuram, Tamil Nadu (Sankaranarayanan *et al*. 2010)
Eczema	Paste	Ethnic communities, Thottianaickans Semmalai hills Tiruchirappalli, Tamil Nadu (Ganesan *et al*. 2006)
Leucorrhea	NR Juice	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015) Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Psoriasis	Paste	Malayali and Narikuravar communities, Erode, Tamil Nadu (Silambarasan *et al*. 2017)
Skin diseases	NR Juice	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015 Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Anemia	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015)
Fever	NR Paste Powder mixed with honey or milk NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015) Local communities, North Eastern Uttar Pradesh (Qayum *et al*. 2016) Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019) Local tribes Warangal District, Telangana (Nagaraju 2024)
Lumbar pain	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015)
Anti-ageing	Extract, Oil, and Decoction	Indigenous groups, Dakshin Dinajpur, West Benga (Sarkar *et al*. 2023)
Lactation	Infusion	Tribal women, Nandurbar Maharastra (Tayade and Patil, 2006)
Insomnia	Powder mixed with onion juice	Tribal people, Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
Arthritis	Decoction mixed with *Tinospora cordifolia*, *Erythroxylon monogynum* and *Alpinia galangal* roots taken internally	Malasar tribes, Coimbatore, Tamil Nadu (Kumar *et al*. 2007)
Abortion	Paste mixed with cow milk	Rural populations, Churu Thar desert, Rajasthan (Parveen *et al*. 2007)
Infertility	Powder mixed with honey	Traditional healers, Gulbarga, Karnataka (Ghatapanadi *et al*. 2011)
Menstrual cycle	Root mixed with Sugar Powder mixed with honey or milk	Tribal women Pandhurna communities Chhindwara, Madhya Pradesh (Sharma *et al*. 2010) Villagers and local practitioners, Ranchi, Jharkhand (Sharma *et al*. 2010; Suman *et al.* 2019)
Colds	Root mixed with seeds of black pepper and candy	Tribal communities in Dang, Rajasthan (Sharma and Khandelwal, 2010)
Ulcers	Paste mixed with milk Paste and Powder	Tribes of West Singhbhum Jharkhand (Topno and Sinha, 2018 Traditional healers of Malayali tribes, Bodamalai Hills, Namakkal district, Tamil Nadu (Nigesh *et al*. 2025)
Blisters	Paste mixed with milk	Tribes of West Singhbhum Jharkhand (Topno and Sinha, 2018)
Wounds	Juice NR Paste and Powder	Local community, Tapkeshwari Hill, Bhuj, Kachchh, Gujarat (Patel *et al*. 2010) Local communities, Malshiras Tehsil Solapur, Maharashtra (Aiwale *et al*. 2022 Traditional healers of Malayali tribes, Bodamalai Hills, Namakkal district, Tamil Nadu (Nigesh *et al*. 2025)

Boils	Paste	Local community, Tapkeshwari Hill, Bhuj, Kachchh, Gujarat (Patel *et al*. 2010
	NR	Local communities, Malshiras Tehsil Solapur, Maharashtra (Aiwale *et al*. 2022)
Cough	Powder mixed with honey or milk	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019
	Root mixed with sugar	Indigenous communities of Gandhamardan Mountain Bargarh, Odisha (Pandey *et al*. 2024)
Weakness	Powder mixed with honey or milk	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)
Vomiting	Extract	Local people and traditional healers, Mahendergarh district, Haryana (Yadav and Bhandoria, 2013)
Fistulas	Paste	Local community, Tapkeshwari Hill, Bhuj, Kachchh, Gujarat (Patel *et al*. 2010)
Liver problems	Extract	Traditional medicines farmers, Uttarakhand (Ravikant *et al*. 2022)
Sexual disorder	NR	Traditional healers in Karayar village, Tirunelveli, Tamil Nadu (Priyadharshana *et al*. 2024)
Leaves		
Cuts and Wounds	NR	Irular tribes of the Marudhamalai hills in Coimbatore (Senthilkumar *et al*. 2006)
	Paste applied externally	Thoriya ethnic group, Nilgiri Tamil Nadu (Patharaj and Kannan, 2017)
	NR	Local communities, Malshiras Tehsil Solapur Maharashtra, India (Aiwale *et al*. 2022)
Asthma	Extract	Jaunsari tribe, Garhwal Himalaya, Uttarakhand (Bhatt and Negi, 2006)
	Cooked leaf	Jaintia tribe, Meghalaya (Jaiswal 2010)
	NR	Local community, Amarawati, Maharashtra (Gawai and Tippat, 2024)
Cough	Juice	Tribal communities and local healers, Chatara Sonebhadra, Uttar Pradesh (Singh *et al*. 2010)
	Infusion and Juice	Tribes of Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
	NR	Local community, Amarawati, Maharashtra (Gawai and Tippat, 2024)
Jaundice	Extract	Jaunsari tribe, Garhwal Himalaya, Uttarakhand (Bhatt and Negi, 2006)
	Extract	Tribes of Bijagarh and West Nimar, Madhya Pradesh (Mahajan 2007)
	Extract	Mullukuruma tribe, Wayanad district, Kerala (Silja *et al*. 2008)
	Cooked leaf	Jaintia tribe, Meghalaya (Jaiswal 2010)
	NR	Tribal communities and local healers, Chatara Sonebhadra, Uttar Pradesh (Singh *et al*. 2010)
	Powder	RajgondTribe, Haladkeri Village, Bidar District, Karnataka (Suryawanshi and Vidyasagar *,* 2015)
	Extract	Kurichiyas, Kurumas, and Paniyas tribes of Wayanad, Kerala (Marjana *et al*. 2018)
	Infusion and Juice	Tribes of Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
	NR	Local communities, Malshiras Tehsil Solapur Maharashtra (Aiwale *et al*. 2022)
	NR	Local community, Amarawati, Maharashtra (Gawai and Tippat, 2024)
Anemia	Extract	Mullukuruma tribe (Silja *et al*. 2008)
	NR	Khondustribes, Munchingiputtu Mandal, Visakhapatnam, Andhra Pradesh (Padal *et al.* 2012)
	NR	Chakma tribes, Tripura (Guha and Chakma, 2015)
	Extract	The Kurichiyas, Kurumas, and Paniyas of Wayanad, Kerala (Marjana *et al*. 2018)
Kidney problems	NR	Tribes of Bijagarh and West Nimar, Madhya Pradesh (Mahajan 2007)
	Extract	Tribes, Jashpur, Chhattisgarh (Kurre 2015)

	NR	Tribal community, Bhiwani district, Haryana (Singh *et al*. 2015)
	Powder taken orally	Irular Tribes, Nilgiri District, Tamilnadu (Panneer Selvam *et al.* 2017)
	Powder with milk	Local inhabitants, Kapurthala, Punjab (Kaur *et al.* 2020)
	NR	Local community, Amarawati, Maharashtra (Gawai and Tippat, 2024)
	Juice	Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
	Leaves consumed orally	Ethnic groups, Barjala area West Tripura district, Tripura (Dhar *et al*. 2025)
Skin diseases	Paste	Local healers, Various district Assam (Saikia *et al*. 2006)
	NR	Tribal community, Bhiwani district, Haryana (Singh *et al*. 2015)
	Paste	Ethnic communities Buxoi Chhatrpur, Madhya Pradesh (Rai 2017)
	NR	Local community, Amarawati, Maharashtra (Gawai and Tippat, 2024)
	Juice	Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Body pain	Juice	Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
	Powder taken orally	Irular Tribes, Nilgiri District, Tamilnadu (Panneer Selvam *et al.* 2017)
Scorpion sting bites	Extract applied externally	Local village communities, Udhampur J&K (Bhatia *et al*. 2014)
	Paste applied externally	Primitive and Vulnerable tribes, North Coastal region of Andhra Pradesh (Rao *et al*. 2023)
Heart problem	Cooked leaf	Jaintia tribe, Meghalaya (Jaiswal 2010)
	Juice	Tribal communities and local healers, Chatara Sonebhadra, Uttar Pradesh (Singh *et al*. 2010)
	NR	Khondustribes, Munchingiputtu Mandal, Visakhapatnam, Andhra Pradesh (Padal *et al.* 2012)
	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015)
	Extract mixed with honey	Irular, Mudugar, Dhodugar, and Kurumbar tribes, Attappady tehsil, Palakkad, Kerala (Pa and Suganthi, 2017)
	Cooked leaves	Indigenous communities, Gandhamardan Mountain Bargarh, Odisha (Pandey *et al*. 2024)
Stomach problem	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015)
	Extract mixed with honey	Irular, Mudugar, Dhodugar, and Kurumbar tribes, Attappady tehsil, Palakkad, Kerala (Pa and Suganthi, 2017)
	Juice mixed with honey	Herbal practitioners and villagers, Anantagiri and Dhamagundam forest, Vikarabad, Telangana (Sureshbabu and Ramakrishna, 2018)
	Leaves boiled and consumed	Fishermen and rural communities, Tranquebar regions, Tamil Nadu (Dhaarani *et al*. 2018)
	NR	Local community, Amarawati, Maharashtra (Gawai and Tippat, 2024)
	Juice	Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Liver diseases	Cooked and consumed	Tribal communities, Odisha (Nayak and Thirunavoukkarasu, 2016)
	Infusion and Juice	Tribes of Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
	Powder mixed with milk	Local inhabitants, Kapurthala, Punjab (Kaur *et al.* 2020)
Urinary disorders	Decoction	Madugga tribes, Siruvani forest, South India (Soudahmini *et al*. 2005)
	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015)
Rheumatism	Decoction	Madugga tribes, Siruvani forest, South India (Soudahmini *et al*. 2005)
	Boiled with rice and garlic rubbed	Rural populations, Churu, Thar desert, Rajasthan; Parveen *et al*. 2007)

Eye lotion	Juice	Malamalasar tribe, Parambikulam wildlife sanctuary, Kerala (Yesodharan and Sujana, 2007)
Blood purification	Juice Juice	Tribal communities and local healers, Chatara Sonebhadra, Uttar Pradesh (Singh *et al*. 2010) Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
Eczema	Powder and mustard oil rubbed	Rural populations, Churu, Thar desert, Rajasthan (Parveen *et al*. 2007)
Snake bites	Juice NR Juice Extract applied externally	Tribal communities and local healers, Chatara Sonebhadra, Uttar Pradesh (Singh *et al*. 2010 Tribal communities and local healers, Rewa , Madhya Pradesh (Shukla *et al*. 2010) Tribal communities, Sonapur, Kamrup district, Assam (Sharma and Sharma 2010) Local village communities, Udhampur J&K (Bhatia *et al*. 2014)
Haemorrhage	Juice	Tribal communities in Mayurbhanj district, Odisha (Yadav *et al*. 2024)
Eye problems	Extract Ashes Filtrate Extract mixed with honey Juice	Jaunsari tribe, Garhwal Himalaya, Uttarakhand (Bhatt and Negi, 2006) Rural communities, Churu, Thar desert, Rajasthan (Parveen *et al.*2007) Traditional healers, Gulbarga, Karnataka (Ghatapanadi *et al*. 2011) Irular, Mudugar, Dhodugar, and Kurumbar tribes, Attappady tehsil, Palakkad, Kerala (Pa and Suganthi, 2017) Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Fever	NR Infusion and Juice	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015) Tribes of Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
Oedema	Juice NR	Tribal communities, Sonapur, Kamrup district, Assam (Sharma and Sharma, 2010) Chakma tribes, Tripura (Guha and Chakma, 2015)
Bladder stones	Leaves and soya bean roasted, applied on urinary bladder	Traditional healers in Dongargan Ahmednagar, Maharastra (Salave and Reddy, 2011)
Ringworm and scabies	Decoction and coconut oil boiled and applied externally NR	Locals And Practitioners, Bhadrak, Odisha (Panda *et al*. 2016 Tribes of West Singhbhum, Jharkhand (Topno and Sinha, 2018)
Diabetes	Extract mixed with honey Powder taken orally	Irular, Mudugar, Dhodugar, and Kurumbar tribes, Attappady tehsil, Palakkad, Kerala (Pa and Suganthi, 2017 Irular Tribes, Nilgiri District, Tamilnadu (Panneer Selvam *et al.* 2017)
Abdomen pain	Powder mixed with honey	RajgondTribe, Haladkeri Village, Bidar District, Karnataka (Suryawanshi and Vidyasagar , 2015)
Lumbar pain	NR	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015)
Leucorrhea	NR Juice	Tribal community, Bhiwani district, Haryana (Singh *et al.* 2015) Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Boils	NR	Local communities, Malshiras Tehsil Solapur Maharashtra (Aiwale *et al*. 2022)
Alcoholism	NR	Local community, Amarawati, Maharashtra (Gawai and Tippat, 2024)
Dropsy	Juice	Indigenous peoples, Jorbeer Conservation Reserve, Bikaner, Rajasthan (Devra and Jain, 2024)
Entire plant		
Cuts and Wounds	Applied externally (NR)	Tribal communities, Buldhana District, Maharashtra (Korpenwar 2012)

Postnatal care	Decoction	Rural residents, Kozhikode, Kerala (Anvar and Haneef, 2015)
Jaundice	Decoction	Tribes, Satpura Plateau, Central India (Pandey and Shukla, 2008)
	NR	Gujjar, Tharu, and Bhoxa tribes, Sub-Himalayan region Uttarakhand (Sharma *et al*. 2012)
	Decoction + black peppers and garlic	Local people and traditional healers, Mahendergarh district, Haryana (Yadav and Bhandoria, 2013)
	Extract	Tribes, Bankura district, West Bengal (Sinhababu and Banerjee, 2013)
	NR	Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
	NR	Paliyar tribes,Sadhuragiri hills, Southern Western Ghats, Tamil Nadu (Aadhan and Anand, 2018)
	NR	Tribal groups, Lalgarh forest range, West Bengal (Manna and Mishra, 2018)
	Juice taken 2 - 3 spoon daily	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)
	Powder, Paste, Infusions	Tribes, Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
	Extract	Bhil, Gond, Sahariyas tribes and rural community, Guna district, Madhya Pradesh (Samar *et al.* 2020)
	NR	Indigenous people, Achanakmar, Chhattisgarh (Shriwas *et al*. 2023)
	NR	Tribal, local people, and traditional healers, Nagri Block, District Dhamtari, Chhattisgarh (Nag *et al*. 2024)
Urinary problems	Decoction	Tribes, Satpura Plateau, Central India (Pandey and Shukla, 2008)
	NR	Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
	NR	Kolam tribe, Adilabad Telangana,and Chandrapur, Yavatmal, Nanded, and Wardha, Maharastra (Nalla and More, 2018)
	Extract	Bhil, Gond, Sahariyas tribes and rural community, Guna district, Madhya Pradesh (Samar *et al.* 2020)
Menstrual cycle	Juice taken 2 - 3 spoon daily	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)
Skin diseases	Applied externally(NR)	Tribes, Satpura Plateau, Central India (Pandey and Shukla, 2008)
	Roasted, powdered + coconut oil	Tribals of Papikondalu forest, Andhra Pradesh (Kumar *et al*. 2015)
	Extract	Local communities, Chanchal, Malda District, West Bengal (Some and Mukherjee, 2018)
	NR	Paliyar tribes,Sadhuragiri hills, Southern Western Ghats, Tamil Nadu (Aadhan and Anand, 2018)
	Powdered and mixed with ginger	Native communities, Kotdwara-Bhabhar Range, Uttarakhand (Rawat 2023)
	NR	Tribal, local people, and traditional healers, Nagri Block, District Dhamtari, Chhattisgarh (Nag *et al*. 2024)
Haemorrhage	NR	Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
	Powdered and mixed with ginger	Local populations, Kotdwara-Bhabhar Range, Uttarakhand (Rawat 2023)
Liver disorders	Decoction	Tribal inhabitants, Peth taluka, Nashik, Maharashtra (Jondhale *et al*. 2018)
	Extract	Bhil, Gond, Sahariyas tribes and rural community, Guna district, Madhya Pradesh (Samar *et al.* 2020)
	Powdered and mixed with ginger	Native communities, Kotdwara-Bhabhar Range, Uttarakhand (Rawat 2023)
Sexual inadequacy	Decoction	Tribes, Digras tehsil, Yavatmal, Maharastra (Lachure 2012)
	NR	Locals, Harike Wildlife Sanctuary, Punjab (Gautam and Adhikari, 2023)
Snake bites	Powder, Paste, Infusions	Tribes, Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
Diabetes	Juice	Kolams, Naikpods, Pardhans, Gonds, Chenchus, Thotis, Mathuras tribes, Adilabad, Telangana (Rama Krishna *et al*. 2014)
	Powder, Paste, Infusions	Tribes, Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
Fever	Juice taken 2 - 3 spoon daily	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)

	Powder, Paste, Infusions	Tribes, Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
Stomach problems	Paste + cumin consumed	Irula tribes,Hasanur Hills, Erode, Tamil Nadu (Revathi and Parimelazhagan, 2010)
	Paste + cumin consumed	Tribes, Mananthavady Bathery and Vythiri taluka, Wayanad, Kerala (Devi Prasad *et al*. 2013)
	NR	Local communities, Taindol Village Jhansi, Uttar Pradesh (Rahul 2013)
	Juice taken 2 - 3 spoon daily	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)
	Powder, Paste, Infusions	Tribes, Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
Asthma	Dried powder smoked	Santhalis tribes, Guskara, Burdwan district, West Bengal (Sunanda and Ranjan, 2011
	NR	Local communities, Taindol Village Jhansi, Uttar Pradesh (Rahul 2013)
	NR	Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
	Powder, Paste, infusions	Tribes, Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
Weakness	Juice taken 2 - 3 spoon daily	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)
	NR	Locals, Harike Wildlife Sanctuary, Punjab (Gautam and Adhikari, 2023)
Kidney problems	NR	Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
	Powder, Paste, infusions	Tribes, Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
	NR	Locals, Harike Wildlife Sanctuary, Punjab (Gautam and Adhikari, 2023)
	Juice	Indigenous communities of Gandhamardan Mountain Bargarh, Odisha (Pandey *et al.* 2024)
Colds, Eye problem, Inflammation, Spleen enlargement, and Tumors	NR	Local communities, Taindol Village Jhansi, Uttar Pradesh (Rahul 2013)
Heart diseases	NR	Local communities, Taindol Village Jhansi, Uttar Pradesh (Rahul 2013)
	NR	Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
	Juice taken 2 - 3 spoon daily	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)
Anemia	NR	Local communities, Taindol Village Jhansi, Uttar Pradesh (Rahul 2013)
	Oral consumption	Tribal and Indigenous community Ranchi, Jharkhand (Linda, 2015)
	NR	Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
	Extract	Local inhabitants, Kapurthala, Punjab (Kaur *et al.* 2020)
Blood purification	NR	Local communities, Taindol Village Jhansi, Uttar Pradesh (Rahul 2013)
	Extract	Tribes, Bankura district, West Bengal (Sinhababu and Banerjee, 2013)
Cough	NR	Paliyar tribes,Sadhuragiri hills, Southern Western Ghats, Tamil Nadu (Aadhan and Anand, 2018)
	Juice taken 2 - 3 spoon daily	Villagers and local practitioners, Ranchi, Jharkhand (Suman *et al.* 2019)
Leucorrhea	Decoction	Santhalis tribes, Guskara, Burdwan district, West Bengal (Sunanda and Ranjan, 2011
	NR	Local communities, Taindol Village Jhansi, Uttar Pradesh (Rahul 2013

	Extract	Tribes, Bankura district, West Bengal (Sinhababu and Banerjee, 2013)
Development of new body cells	Juice	Local people and traditional healers, Mahendergarh district, Haryana (Yadav and Bhandoria, 2013)
Nervous system disorder	NR	Local and tribal people, Una and Hamirpur district, Himachal Pradesh (Chand *et al*. 2016)
Stem		
Urinary problems	Tender shoot Bark decoction	Tribal community, northeast Gujarat (Punjani 2010) Tribes, Vindhya region, Madhya Pradesh (Mishra 2015)
Snakebite, Indigestion, Coughing, and Vomiting	Stem Powder mixed with giloy and tulsi	Tribes, Kuarmunda Block, Sundergarh, Odisha (Bagartee and Choudhury, 2020)
Flower		
Cataracts	NR	Banraji community, Kumaun, Uttarakhand (Bisht and Adhikari, 2018)
Seed		
Fever, Constipation, Anemia, Cardiac disorders, Urinary infections, Stones, Lumbar pain, Skin diseases, and Leucorrhea	NR	Tribal community, Bhiwani, Haryana (Singh *et al*. 2015)

NR: Not Reporting

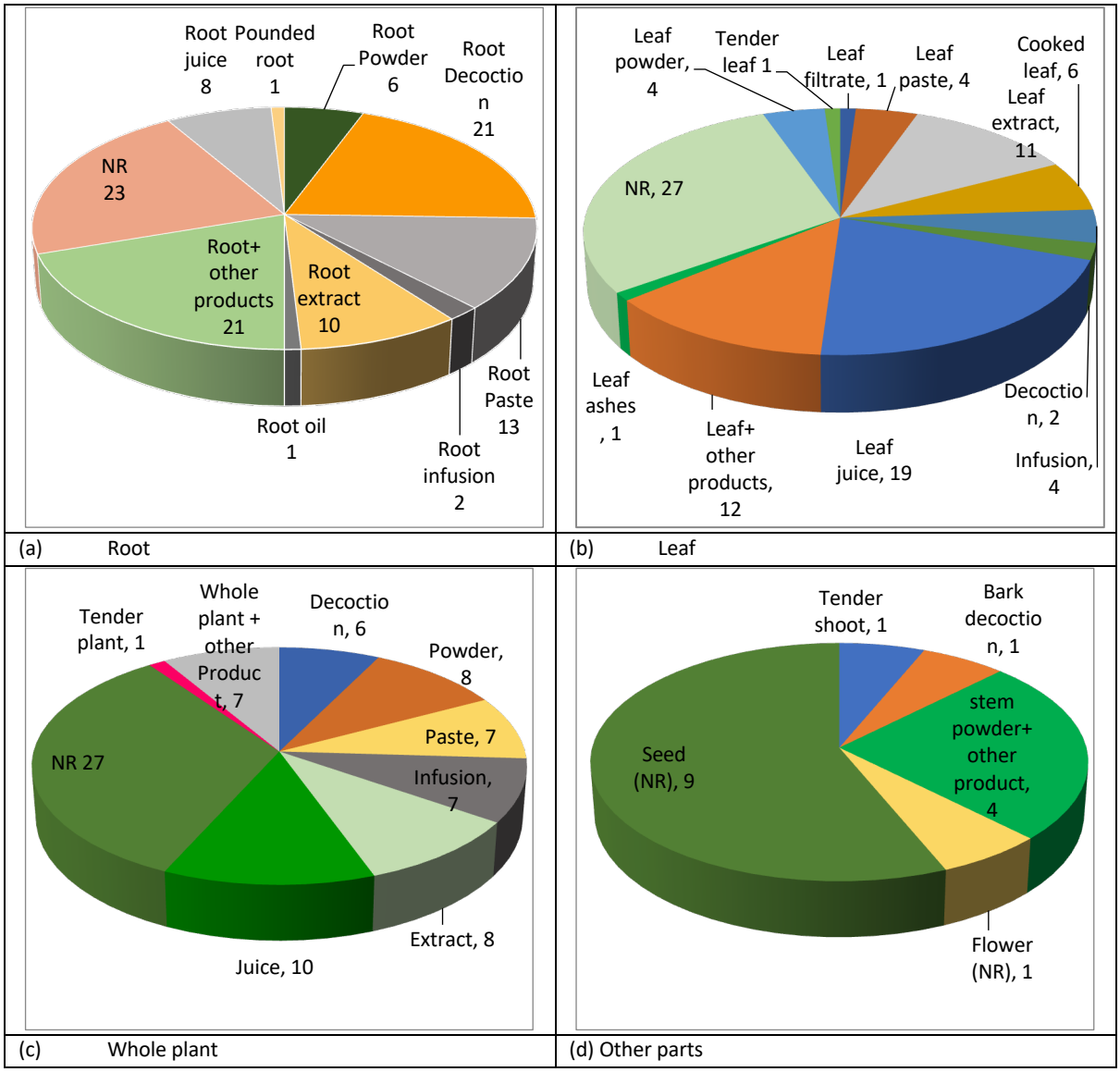

Figure 2. Mode of administration of plant parts for treating ailments by various communities in India

Use of plant parts for curing one or more ailments

The literature review reveals that indigenous communities utilize different parts of plants to address various ailments. The Jaunsari community in Uttarakhand's Garhwal Himalaya treat jaundice, asthma, and vision problems using decoctions made from roots and extracts from leaves (Bhatt and Negi 2006). In the Churu Thar desert of Rajasthan, night blindness is remedied with ashes derived from roots and leaves (Parveen et al. 2007). The tribal populations in northeast Gujarat employ tender branches and root extracts for treating urinary tract issues (Punjani 2010). In Munchingiputtu Mandal Visakhapatnam, Andhra Pradesh, the Khondus tribe uses roots and leaves to alleviate stomach pains and anemia, while the Valmiki tribe applies leaves for chest illnesses (Padal et al. 2012). Tribal groups in Bhiwani, Haryana, utilize roots, leaves, and seeds to address stomach disorders, heart diseases, kidney infections, skin ailments, leucorrhea, fever, lumbar pain, and employ roots and seeds for treating anemia (Singh et al. 2015). In Haladkeri village, Bidar, Karnataka, the Rajgond community combines root powder with honey and leaf powder to combat jaundice (Suryawanshi and Vidyasagar 2015). Additionally, the Irular tribes in the Nilgiri region of Tamil Nadu utilize root and leaf powders to address kidney disorders (Panneer Selvam et al. 2017). The residents and traditional healers in Ranchi, Jharkhand, apply a mixture of root powder with honey or milk and 2-3 spoons of whole plant juice to address issues such as stomach ailments, heart conditions, jaundice, fever, menstrual irregularities, cough, and general weakness (Suman et al. 2019). In Kapurthala, Punjab, the local population employs a decoction of roots and leaf powder mixed with milk to treat kidney disorders (Kaur et al. 2020). Tribal communities in Kuarmunda Block, Sundergarh, Odisha, utilize leaf infusion and leaf juice, along with powdered stems mixed with giloy and tulsi, to alleviate cough; they also

use whole plant powder, paste, and infusions combined with giloy and tulsi to remedy snake bites, and leaf infusion, leaf juice, and whole plant powder, paste, and infusions to combat jaundice, fever, and stomach issues (Bagartee and Choudhury 2020). In Malshiras Tehsil, Solapur, Maharashtra, locals make use of leaves and roots for the treatment of jaundice, boils, and wounds (Aiwale et al. 2022). Indigenous groups in the Jorbeer Conservation Reserve, Bikaner, Rajasthan, utilize root and leaf juice to relieve stomach-related ailments, kidney issues, dropsy, eye conditions, Leucorrhea, and skin ailments (Devra and Jain 2024).

Plant Part Value (PPV)

The findings on plant part value (PPV) revealed that local communities primarily utilize the roots, leaves, and whole plant for medicinal purposes. The root had the highest PPV at 34.51%, while the leaves followed with a PPV of 27.43%. The whole plant was recorded at 24.78%, and the seeds had a PPV of 7.96%. In contrast, the stem and flower presented PPVs of 4.42% and 0.88%, respectively (Fig.3).

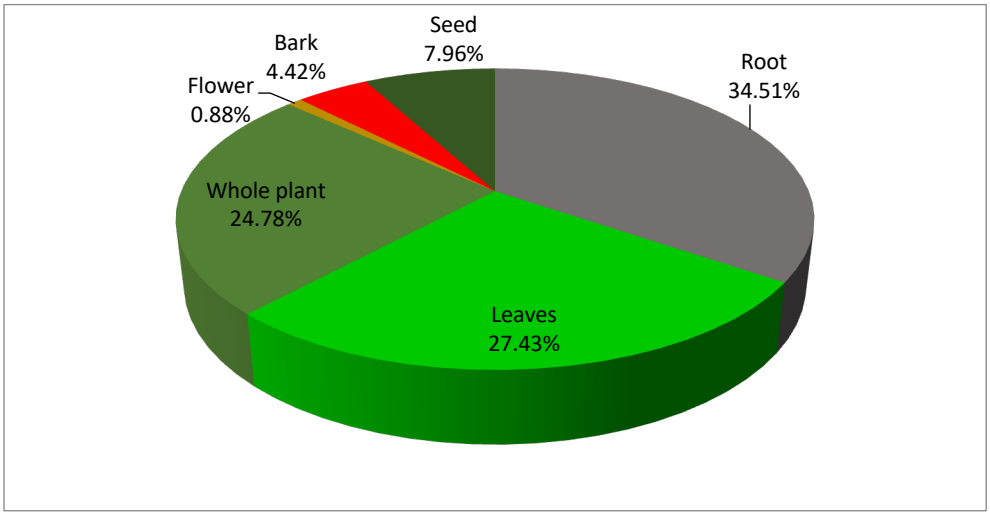

Figure 3. Plant parts value (PPV) estimation of *B. diffusa*

Fidelity Level (FL)

Based on the analysis of fidelity level (FL) data, *B. diffusa* is predominantly utilized for treating jaundice (11.34%), kidney issues (7.80%), gastrointestinal disorders (7.09%), heart conditions (6.02%), as well as asthma and bronchitis (5.67%), eye ailments (5.32%), urinary problems (3.90%), anemia (3.54%), and skin conditions (4.96%) (Table 2). The findings indicate that *B. diffusa* is also employed to address 35 distinct ailments, such as fever, cough, leucorrhea, cuts and wounds, liver diseases, dropsy, snakebites, diabetes, blood purification, and abdominal pain.

Table 2. Fidelity Level (FL) of different parts of *B. diffusa* in Indian subcontinent. Only uses with FL ≥ 3% are displayed

Part of Plant	**N_P**	**N**	**F.L.% = (N_p/ N) × 100**
Jaundice	32	282	11.34
Kidney problem	22	282	7.80
Stomach related disorder	20	282	7.09
Heart disorder	17	282	6.03
Asthma & bronchitis	16	282	5.68
Eye disorder	15	282	5.32
Skin diseases	14	282	4.96
Urinary troubles	11	282	3.90
Anemia	10	282	3.54
Fever	9	282	3.19

Discussion

The ethnobotanical research on *Boerhavia diffusa* has demonstrated its wide-ranging medicinal applications for several common health issues. This current study found that either the plant's individual components or the entire plant can be utilized alone or in combination with other plant parts to address various health concerns. The findings indicated that the

root is the most valued part of the plant (PPV=34.51%), which is consistent with the phytochemical analysis conducted by Kumar et al. (2016), who indicated that the highest amount of the active compound boeravinone B is found in the roots. Their work suggests that the roots of *B. diffusa* comply with Indian pharmacopoeial standards and criteria for standardization, indicating that they can be consumed daily with all components present within a safe range. In a similar vein, Sharma et al. (2023) discovered that the flavonoid boeravinone B is the most biologically active part of the plant; its concentration is highest in the root (6.63%), lower in the leaves (4.28%), and the lowest in the shoots (3.08%). Patil and Bhalsing (2016) identified 180 different compounds within the *Boerhavia* genus, with *B. diffusa* itself containing approximately 131 of those compounds.

According to Wajid et al. (2017), the essential bioactive components of the plant that contribute to its medicinal properties include flavonoids, alkaloids, and triterpenoids. The available literature also highlights the significant ethnomedicinal importance of the roots and leaves, as demonstrated by the in-vitro and in-vivo phytochemical studies conducted by Gaur et al. (2022), which identified all active ingredients, such as lignan, alkaloids, polyphenols, rotenoids, flavonoids, ecdysteroids, and steroids, showcasing the diverse pharmacological activities of the roots and leaves. The fidelity level values further suggest that *B. diffusa* is predominantly utilized for treating jaundice, kidney issues, stomach disorders, heart diseases, asthma, as well as eye and skin conditions by various ethnic communities across the Indian subcontinent. Previously, Gour (2021) investigated the therapeutic properties of I in addressing a range of clinical conditions, as referenced in the Charaka Samhita, Sushruta Samhita, and Ayurveda.

The research indicated that traditional healers and Indian ethnic communities primarily utilize the juice from the roots, leaves, bark, and whole plant to address 37 distinct ailments. Fresh juice is favored due to its ease of preparation through crushing the plant in a stone mortar, and it appears to be the most effective method for extracting the vitamins and minerals present in the plant (Ambu et al. 2020). Additionally, ethnic groups use various preparation methods such as decoction (30), extract (29), paste (24), and powder (18) to treat a range of disorders as detailed in this study.

B. diffusa is an important medicinal plant found in the Indian subcontinent, utilized for the treatment of various human ailments. Its remarkable ethnomedicinal properties and widespread application by traditional healers and ethnic communities across nearly all of India highlight the need to thoroughly document the valuable knowledge possessed by TM practitioners and contribute to the conservation of this significant herb. Although several studies validate the traditional applications of the herb, most do not adequately identify the specific mechanisms through which the bioactive medicinal phytocompounds combat infectious diseases. Future research could focus on determining its effects at the molecular level against different diseases, as well as exploring the pharmacological and toxicological aspects of any previously unrecognized secondary metabolites.

Conclusion

The systematic review of research highlights the widespread traditional use of *B. diffusa* by various ethnic groups in the Indian subcontinent for treating numerous health issues, with the most prevalent being jaundice, kidney disorders, digestive issues, cardiovascular problems, asthma, eye conditions, skin issues, urinary troubles, and anemia. To validate the herb's effectiveness, it's necessary to conduct more targeted clinical trials and thorough evidence-based studies. Additionally, there should be a focus on research that employs suitable test models to explore the molecular functions of phytomolecules in both prevention and treatment. Promoting traditional knowledge and raising awareness about the significance, diverse applications, and ethnomedicinal value of this medicinal herb is crucial. Moreover, due to its numerous benefits, a truly extraordinary plant deserves a role in society for the enduring well-being of individuals.

Declarations

Ethics approval and consent to participate: The data were collected with respect to confidentiality, anonymity, and consent.
Consent for publication: Not applicable.
Availability of data and materials: The data was not deposited in public repositories.
Competing interests: The authors declare no conflict of interest.
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Author's contributions: Sandeep Pandey prepared the Study design, manuscript writing, data analysis and interpretation. Finally, reviewed and edited the manuscript.

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