

Indian tribe's and villager's health and habits: Popularity of apocynaceae plants as medicine

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Abstract

The aim of this review is to highlight the folkloric uses of Apocynaceae plants among the ethnic and tribal communities of India. India is rich in its cultural heritage. All climatic zones in Indian subcontinent make it a hub of varied Flora. Around 54 plant species of the Apocynaceae family works as medicine among the tribes (scheduled caste - 16.6%, scheduled castes - 8.6%) and villagers as home remedy or as a therapy provided by the local vaid. The presence of cardiac glycosides and alkaloids, iridoids, and terpenoids make Apocynaceae family as the fifth valuable medicinal plant family in Angiosperms. Folk medicinal uses of the taxonomically identified Apocynaceae plants can be potential source of lead compounds or novel drugs for the treatment of wide range of diseases/problems such as antidote to poisonous bite, malaria, cancer, diabetes, liver diseases, skin problems, gynaecological problems, and reproductive tract infections. This trend is an emerging discipline called reverse pharmacology approach, i.e., from “laboratory to clinic” to “clinics to laboratories”.

Key words: Apocynaceae, Indian tribes, traditional medicines

INTRODUCTION

Apocynaceae Family

Apocynaceae is one of the ten largest angiosperm families (including Asclepiadaceae) and comprises several prominent medicinal plants. Today, this family has grown to 392 genera and 5140 species worldwide mostly distributed in tropical and subtropical regions, some found in torrid zones. The family is represented by 30 genera and 60 species, in India in the form of trees, shrubs and vines.^[1,2] The Indian subcontinent is well known for its unity in diversity. The continent is divided into all climatic zone and vegetation including the islands weather. Around 16.6% of scheduled tribes and 8.6% of scheduled of different ethnicity of which 70% reside in village and 30% in urban areas. These people are an encyclopedia of plants and their all aspects of use for human welfare. They are the inheritors of the Vedic and pre-Vedic cultures. Charaka and Shushrutha are greatest physicians of ancient India and compiled the varied applications of plants for human health

care in the textbooks called Samhitas. In India, Ayurveda, Siddha, and Unani systems of medicine have coexisted with yoga, naturopathy and homeopathy for centuries. Traditional Indian medicine is provided in 2860 Indian hospitals. About 25% of modern medicines are descended from plants first used traditionally. The vaid or the ethnic people used different parts of herbs in the form of Kwatha (decoction), Phanta (hot infusion), Hima (cold infusion), Arka (liquid extract), Churna (powders), Guggul (resins and balsams), Taila and Kuzhambus (medicated oil) and Bhasma (residue after incineration - calcined preparation), Ghrtam, Lehyams, Gulika, Arishtas and Asavas and poulitice, pishti (powdered gem or metal), etc., The plants are has sociocultural (ornamental/offering in temples) importance in India. Allamanda, Alstonia, Catharanthus,

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Nerium, Plumeria, Thevetia, and Tabernaemontana give flowers throughout the year. The plants are present as habitat or naturalized throughout India from Southern tropical rainforest to the temperate forest of the Himalayan foothills. A characteristic feature of the family is that almost all species produce milky sap. Leaves are simple, opposite and whorled. Flowers are large and colorful. This includes some of the important large genera such as Rauvolfia, Tabernaemontana, Parsonsia, Aspidosperma, Apocynum, Plumeria, Vinca, and Catharanthus. About 25 species from 16 genera of this family have ethnobotanical importance. Hence, the family members of Apocynaceae are prone for adulteration, when it is used in the traditional medicinal herbal mixtures that will have very serious biosafety implications species of Apocynaceae have also been reported to possess pharmacological activities such as anticancer, diabetes, antiplasmodial, antiulcer, hypoglycemic, and antirheumatic.^[2] A medicinal property of Apocynaceae family plants is among the top five of any other family plants. "Many Apocynaceae are used as herbal medicines and much is known about the presence of toxic secondary metabolites, in particular, cardiac glycosides and alkaloids such as simple indoles, carbolines, steroidal alkaloids and quinindolines, iridoids. Terpenoids, pentacyclic triterpenes, glycosides, and many other antioxidants metabolites are present which make Apocynaceae associated with use by humans."^[3]

In traditional medicine, Apocynaceae plants are claimed to treat gastrointestinal ailments, fever, malaria, pain and diabetes, skin problem, female issues, and male problems by the villagers/tribes of India.^[4,5]

In this direction, the authors have tried to compile the traditional/ethnic usage of Apocynaceae plants, 30 genera and 54 species are studied. Asclepiadaceous plants are not included in the study to keep the review precise and brief. The study included ethnic uses of Apocynaceae plants among various tribes, villagers, and traditional medicine practitioners in India. Common Indian names, distribution and popular herbal formulations available in Indian market [Table 1]. The abundance of use of these plants in major disease/ailment categories such as skin, ears, nose and throat (ENT), sexually transmitted diseases, gastrointestinal tract (GIT), family planning (increasing the vitality and ensuring better sexual life treatment of semen treating leukorrhoea and menorrhagia infertility of woman ensuring easy delivery prevention of pregnancy termination of pregnancy), reproductive tract infections, and dental and other (fever, pain, antidote, eye, etc.) is shown in Table 2.

Source of Information

This is a literature-based study. Information has been taken from various sources such as websites, journals, books and practical projects, from experts, and documented reports from farmers. Search engines (Yahoo, Google) are surfed

exhaustively. Renowned journals at National Institute of Science Communication and Information Resources (NISCAIR) Online Periodical Repository (NOPR), Central, Embase, and PubMed, Science Direct, Scopus and Google Scholar using terms such as "Apocynaceae," "Traditional," "Ethnopharmacology," and "Tribes" is searched for citations. e-Database period is updated up to March 2017. Electronic databases available at herbal drug research/botanical survey institutes in India (NISCAIR, AYUSH, Central Drug Research Institute, Council of Scientific and Industrial Research, NVARI and National Botanical Research Institute) were also referred. The study included ethnic uses of around 54 Apocynaceae plant species among various tribes, villagers, and traditional medicine practitioners in India. Common Indian names, distribution and popular herbal formulations available in Indian market and also the important constituent of the plants are presented/tabulated here.

The main objectives of this study are to research scattered medicinal aspects in varied literature and document ethnicity of the family Apocynaceae in India. Collective specific data of this type may simplify the search for new drug for the benefit of human ailments.

MEDICINAL PLANTS, HERBAL PREPARATIONS, AND ACTIVE COMPOUNDS FROM APOCYNACEAE FAMILY PLANTS

Apocynaceae is fifth among the other angiosperm plant family to have its medicinal significance. It is rich source of important secondary metabolites such as alkaloids, cardenolides, iridoids, triterpenoids, and other compounds such as pregnanes, flavonols, and caffeoylquinic acids. Alkaloids of Apocynaceae can be classified as simple indoles, carbolines, steroidal amines, isomeric quinindolines and quinindoles, and bisindoles. Indoles are the predominant alkaloids in Apocynaceae with 2431 types isolated.^[6] Steroids are the next most important with 93 types isolated. The family is given important anticancer drugs. Its pharmacological relevance is mentioned in Table 2.

Various species of Apocynaceae family with its ethnic use among Indian tribe are given below.

***Aganosma* spp.**

***Aganosma dichotoma* (Vernacular name: Malatilata)**

Traditionally uses: *A. dichotoma* is used as antiseptic, emetic, anthelmintic, bronchitis, leprosy, skin diseases, ulcer, inflammations, arthritis, purulent discharges from the ear and diseases of the mouth in India.^[7] Flowers are good for eye diseases and leaves cure biliousness.^[8-12] The plants are mentioned for treatment of semen in Agni Purana. Root

Table 1: Indian Apocynaceae plants with their vernacular names, traditional uses among various tribes and villagers

Plant name	Ayurvedic preparations	Therapeutic uses (A, Y, S, F)	Parts used (Fl, Ft, Sd, St, Rt, APWP, Brk, L, Ltx)	Distribution	References
<i>Aganosma dichotoma</i>	Parpat, Vishagarbha taila, Malatyadi tailam, Jatyadi tailam, jatyadi ghrtam, kalyanaka ghrtam, Aranyatulyasyadi coconut oil	Anodyne and sedative properties, also used for paraplegia, sciatica and Neuralgia. <i>Aganosma dichotoma</i> is used as antiseptic, emetic, anthelmintic, in bronchitis, leprosy, skin diseases, ulcer, inflammations, arthritis, purulent discharges from the ear and diseases of the mouth, eye diseases, biliousness and fever	L, Rt, Fl	Semi-evergreen forests, often along sides of streams. All over India esp. Tamil Nadu: Chennai, Nilgiri, Tiruvannamalai, Kerala: Palakkad, Kollam, Idukki, Thrissur, Kannur	[16,18,19,20,36,77]
<i>Aganosma cymosa</i>	Vishagarbha taila	Same as above	L, whole plant	As above	[15-20]
<i>Allamanda cathartica/Protea nerifolia</i>		Leaves used as a cathartic. Bark and its decoction administered as hydrogogue in ascites	L, Rt, Fl, Ltx, St	Islands, Karnataka: Chikmagalur, Coorg	[10,20,21]
<i>Alstonia rostrata</i>		Acute bronchitis		All over India. Moist deciduous forests and sacred groves, also in the plains. Abundance seen in South India.	
<i>Alstonia scholaris</i>	Amritashtakapachana, Amritarisht, Madhu Nashini, ayurvedic skin detox	Bark used for febrifuge, anthelmintic and galactagogue, chronic diarrhea, asthma, cardiac troubles. Leaves used in beriberi, dropsy and congested liver. Root and bark used for pyrexia, dysentery, earache, skin eruption and abdominal disorders. Latex applied to sores, ulcers, tumors and rheumatic Swellings	L, Fl, Ft, Ltx, brk, Rt		[25-28,95]
<i>Alstonia venenata</i>		Insanity and epilepsy	Rt, L		

(Contd...)

Table 1: (Continued)

Plant name	Ayurvedic preparations	Therapeutic uses (A, Y, S, F)	Parts used (Fl, Ft, Sd, St, Rt, APWP, Brk, L, Ltx)	Distribution	References
<i>Anodendron affine/manubriatum/Syzygium paniculatum</i>	Olivo	Liver corrective and protective, dyspepsia, stomachache	Brk, Ft, St, L	Evergreen, semi-evergreen and deciduous forests, also in the plains. Abundance seen in Assam, Lushai hills, Bihar, West Bengal and Kerala, Karnataka, Tamil Nadu, Andaman Islands, Western Ghats of Maharashtra: Pune, Raigad, Ratnagiri, Satara, Thane	
<i>Apocynum cannabinum</i>	Homeopathic material medica (Sambucus, Apis, Arsenic, Digital; Helleb)	Heart palpitations, earache, headache, nervousness, dizziness, worms and insanity, emetic, venereal warts diseases	WP, Rt, L, Ltx	Found in gravelly or sandy soil, mainly near streams in shady or moist places	[31,32]
<i>Beaumontia/Nepenthes khasiana/longituba/jerdoniana/Grandiflora</i>		Abortifacient, loss in libido, fractures, injury, and rheumatism	Rt, L	Evergreen forest: Tamil nadu, Kerala, District/s: Wayanad, Kasaragode, Kozhikkode western ghats, Tripura, Assam, Manipur, Tropical himalaya	
<i>Carissa carandas/syn. Carissa congesta</i> wight	Marma gutika Kusthahara (48 g. of the drug for decoction)	Stomachic and anthelmintic, cardiac diseases, hemorrhage, diseases of nervous system, thirst, alleviating vata and pitta, hypertension, indigestion. Decoction of leaves given in Intermittent fever	L, Fl, Frt, R, Brk, WP, Ltx	Common in plains and scrub jungles along river banks up to 900 m, dry deciduous forests, also grown in homesteads. Distributed throughout India	[33-36,46,122,165]
<i>Carissa spinarum</i>	Marma gutika	Purgative, eye and ear disorders, vomiting, distaste, carminative, bodyache, throat pain, sweating	Rt, Fl, Ltx		

(Contd...)

Table 1: (Continued)

Plant name	Ayurvedic preparations	Therapeutic uses (A, Y, S, F)	Parts used (Fl, Ft, Sd, St, Rt, APWP, Brk, L, Ltx)	Distribution	References
<i>Cerbera manghas/Cerbera odollam</i>		Emetic and purgative		Found along swamps, Along the sides of water courses, ponds, in coastal areas and mangrove forests Maharashtra: Ratnagiri Karnataka: Mysore, N. Kanara, S. Kanara	
<i>Chonemorpha/megacalyx/Grandiflora/fragrans / griffithii/verrucosa</i>	Perumkurumba kumaryasavam sudarshanavasavam Varanadi kashaya, Yogaraja guggulu and Laghu laksadi taila	Diarrhea, fever, polyuria, anemia, boils, leprosy, eye diseases, vomiting, poisoning, intermittent fever	WP, Rt, Root bark, L	Western Ghats, Moist Deciduous Forests, Evergreen forests and sacred groves in the plains, Maharashtra: Pune, Raigad, Ratnagiri, Sindhudurg Karnataka: Chikmagalur, Coorg, N. Kanara, Shimoga Kerala: Alapuzha, Idukki, Kollam, Malapuram, Palakkad, Pathanamthitta, Thiruvananthapuram, Thrissur, WYNAD Tamil Nadu: Nilgiri	[9,50-55]
<i>Ervatamia/ Tabernaemontana/ heyneana</i>	Jivantiyadi yamaka, Vindu ghrita and Abhram	Local anodyne and chewed for relief from toothache, inflammations of cornea	Rt, L, Fl, WP, Ltx, Rt brk, st brk, Wood	Western Ghats, Moist Deciduous Forests, Endemic to Southern Western Ghats. Maharashtra: Pune, Raigad, Ratnagiri, Satara Kerala: All districts Tamil Nadu: Coimbatore, Kanniyakumari, Nilgiri, Tirunelveli	[53,56]

(Contd...)

Table 1: (Continued)

Plant name	Ayurvedic preparations	Therapeutic uses (A, Y, S, F)	Parts used (Fl, Ft, Sd, St, Rt, APWP, Brk, L, Ltx)	Distribution	References
<i>Holarrhena antidysenterica</i>	Kutajavaleha – Brihat Gangadhara Mahamanjishitadi Kashayam Stanyashodhana Kashaya Patoladi Chooranam Kutajarishita, Madhu Nashini, ayurvedic joint health capsule, skin detox	Astringent, anthelmintic, stomachic, antipyretic, tonic, antidysesteri c, diarrheal, piles, leprosy, worm infestation, thirst, pain, diarrheal, dysentery	L, Brk, Sd	Dry Evergreen to Dry Deciduous Forests, Moist deciduous and dry deciduous forests, also in the plains, Maharashtra: Common throughout Karnataka: Belgaum, Chikmagalur, Coorg, Dharwar, Hassan, Mysore, N. Kanara, Shimoga, S. Kanara Kerala: All districts Tamil Nadu: Coimbatore, Dharmapuri, Salem, Tiruchchirappalli, Tirunelveli, Kerala, Tiruvannamalai, Vellore, Viluppuram, Throughout India except Jammu and Kashmir, Himachal Pradesh, Sikkim, Arunachal Pradesh	[70,95,138-140]
<i>Holarrhena pubescens</i>	Kutajghan Vati, Kutajarishita	Rheumatic pain, skin disease, ringworm infection, dysentery, ease delivery	Frt brk, Ltx, Rt, L		[77,78,99,126]
<i>Ichnocarpus frutescens/ polyanthus</i>	Sariva , emcovine syrup, hairich syrup	Tonic, Diphoretum dyspepsia, Skin troubles, Gall stone.	WP, L, Fl, Rt, leaf stalk	Moist and dry deciduous forests, also in the plains. All districts of Kerala	[95,99,149]
<i>Kopsia fruticosa/arborea</i>		Cardiac, CNS and Cholinergic effects, sores throat, tonsillitis and syphilis	Fl, AP , L, WP	Western Ghats, Cultivated, Native of India China Kerala: All districts Tamil Nadu: Nilgiri	[83,84]
<i>Nerium oleander/indicum</i> Mill.	Misvak, Malatyadi taila, Mustamrtadi churna, Kasisadi taila, Brhat maricadya taila, Laghu visagarva taila, karanjadi taila and Karaviradya taila	Leprosy, wounds, edema, skin diseases, glandular swelling, Poisoning	L, Fl, Rt brk, Rt, Ltx, St brk	Upper Gangetic plains, Himalayas from Nepal to Kashmir up to 2000 m, Central and Southern India	[102-104]
<i>Nerium odorum/indicum soland</i> (white flowers)	Manikya Ras, Chitrakadi Taila, Brihat Marichadi Taila	Allergic dermatitis, fever, fistula, spondylosis, sciatica	Rt, Fl	Cultivated throughout India, abundance in Karnataka	[107]

(Contd...)

Table 1: (Continued)

Plant name	Ayurvedic preparations	Therapeutic uses (A, Y, S, F)	Parts used (Fl, Ft, Sd, St, Rt, APWP, Brk, L, Ltx)	Distribution	References
<i>Ochrosia/eclipta/coccinea/oppositifolia</i>	Ellipticine and 9-methoxy ellipticine	Taken by women in gynecological disorders by Nicobarrese people	L, Fl, AP		[22]
<i>Parameria grandulifera/laevigata</i>		Rheumatism, nephritis, and injury, emmenagogue, menses, cuts and lacerations, dysentery, tuberculosis, after childbirth it help shrink the uterus, febrifuge	Brk, Ltx, L, WP	Rarely seen in India, Arunachal Pradesh	
<i>Parsonia alboflavescens</i> (Dennstedt) Mabbertley		Insanity, leg swellings, disinfectant, tuberculosis, vulnery febrifuge, rheumatism and kidneys	L	Western Ghats, & Eastern Ghats, Moist Deciduous Forests. Maharashtra: Kolhapur, Ratnagiri Karnataka: Chikmagalur, Hassan, N. Kanara, Shimoga, S. Kanara Tamil Nadu: Coimbatore, Kanniyakumari, Nilgiri, Tiruchchirappalli	[20]
<i>Plumeria acuminata</i>		Stimulant, purgative, febrifuge, emmenagogue, dropsically and venereal infection, antitherpetic, rubefacient, rheumatism	L, Fl, Rt and St Brk, Ltx	Karnataka: Hassan, Mysore Kerala: All districts Tamil Nadu: All districts, introduced northern plain, other parts of India	[115-118]
<i>Plumeria alba/frangipani</i>		Ulcer, stimulant, purgative, febrifuge, emmenagogue, dropsical and venereal infection, anti herpatic, rubefacient, rheumatism	L, F, R and Stem Bark, Ltx		[116]
<i>Plumeria obtusa</i>			L, F, R and Stem Bark, Ltx		[106]
<i>Plumeria rubra</i>		Ulcer, stimulant, purgative, febrifuge, emmenagogue, dropsical and venereal infection, anti herpatic, rubefacient, rheumatism, pectoral syrups	L, F, R and Stem Bark, Ltx		[24,111,116,140]
<i>Pottisia laxiflora</i>		Fractures, injury and rheumatism	St, L, Ltx, Rt	North-East India	

(Contd...)

Table 1: (Continued)

Plant name	Ayurvedic preparations	Therapeutic uses (A, Y, S, F)	Parts used (Fl, Ft, Sd, St, Rt, APWP, Brk, L, Ltx)	Distribution	References
<i>Rauvolfia serpentina</i>	Sarpagandhadi gultika, Sarpagandha churna, Sarpagandha vati, Sarpagandhadi churna, Sarpagandha yoga, Sarpagandha ghana vati and Nirgundyadi ghrita	Fever, anxiety, epilepsy, intestinal and nervous disorders, diarrhea and dysentery and also as anthelmintic, cholera, colic and fever, herpes, hypertension	Rt, L, leaf buds, Rt, rhizome	Western Ghats, Moist Deciduous Forests, Commonly Cultivated, Moist deciduous forests, also in the plains, all districts of Kerala	[24,104,114,124,149]
<i>Rauvolfia tetraphylla</i>		Stomachache, muscular and rheumatism pain, cough and cold, mental disorders, ulcer and as wormicidal, respiratory problems, malaria hypertension	WP, Rt, L, Sd.		[24,139,140]
<i>Rauvolfia vomitoria</i>		Fever and indigestion	R, Brk		
<i>Rauvolfia verticillata</i>		Malaria, hypertension and as sedative	All parts		
<i>Strophanthus/caudatus/wallichii/wightianus</i>		Treat injury and snake bites heart stimulant and diuretic	Brk, L, Sd	In scrub jungles and sacred groves along the sea coasts, Western Ghats, Dry Deciduous Forests, Endemic to Southern Western Ghats. Kerala: Alapuzha, Thiruvananthapuram Tamil Nadu: Coimbatore	[20]
<i>Tabernaemontana alternifolia</i>		Rheumatalgia, hypertension and antidote		Moist deciduous forests, also in sacred groves. All districts of Kerala	
<i>Tabernaemontana bufalina</i>		Dysentery, stomachache, ulcers and sores	Frt, L		[22]
<i>Tabernaemontana divaricata</i>		Eye irritation and conjunctivitis, herpes, septic wounds and ulcers, anthelmintic, skin and gum diseases	Fl, L, Rt, Brk, WP, Tender shoot tip		[104]

(Contd...)

Table 1: (Continued)

Plant name	Ayurvedic preparations	Therapeutic uses (A, Y, S, F)	Parts used (Fl, Ft, Sd, St, Rt, APWP, Brk, L, Ltx)	Distribution	References
<i>Thevetia peruviana/cascabella thevetia</i>		Roots are made into a plaster and applied to tumours. Tincture of bark cathartic and emetic, also used as a febrifuge. Leaves purgative and emetic. Seeds used as abortifacient and purgative, in rheumatism and dropsy, also as an alexeteric	Brk, L, Sd, R, Ltx, Ft	Common in wastelands, N-E India: Tripura, Assam, South India: Karnataka: Mysore, N. Kanara, Shimoga Kerala: All districts Tamil Nadu: All districts	[128, 129, 135, 145]
<i>Trachelospermum jasminoides/asiaticum/axillare/auritum/divaricatum</i>		Tuberculosis, bronchitis, rheumatalgia, injury	L, whole plant, Stem, S.	Tropical moist deciduous forest. N+E Himalaya region	[134]
<i>Urceola elastic/micrantha/ huaitingii/tourmieri</i>	Caoutchouc	Stop external bleeding, rheumatalgia, injury	All parts	E-Himalaya, E- & NE-India, Darjeeling	
<i>Vallis solanacea/glabra/ heyneae</i>		Elephantiasis, ring worm infection, eczema, cut, sores and wounds, leprosy, sprue, dyspnoea, piles, carcinoma, bone fracture	Stem, L, Fl, Frt., Ltx	Western Ghats & Eastern Ghats, Moist Deciduous Forests, also Cultivated, Maharashtra, South and Central India.	[147-151]
<i>Vinca major/rosea/ Catharanthus roseus</i> (periwinkle)		Diabetes, menorrhagia, Juice to provide relief in pain of wasp Stings, hypotensive, sedative fever, diarrhoea, diabetes, cancer and skin diseases, hemorrhage	L, Fl, Rt, WP	Found along roadsides and fallows. Naturalized and cultivated throughout India, abundantly in India	[143-145, 154-156]
<i>Vinca pusilla</i> Murr./tiny periwinkle		Lumbago, earache, skin and liver diseases, leprosy, dysentery, worms, ulcers and lowers BP	WP, Rt, Ltx, L		[157, 163, 164]
<i>Willughbeia angustifolia/ edulis</i>		Edema		Coromandal coast, nicobar island, N-E india: Assam	

(Contd...)

Table 1: (Continued)

Plant name	Ayurvedic preparations	Therapeutic uses (A, Y, S, F)	Parts used (Fl, Ft, Sd, St, Rt, APWP, Brk, L, Ltx)	Distribution	References
<i>Wrightia arborea</i>		The latex is applied on cuts, wounds and skin allergy	Ltx	Western Ghats & Eastern Ghats, Dry Deciduous Forests. Maharashtra: Kolhapur, Nasik, Pune, Raigad, Ratnagiri, Thane Kerala: Alapuzha, Idukki, Kannur, Kollam, Palakkad, Pathanamthitta, Thiruvananthapuram, Thrissur Tamil Nadu: Coimbatore, Dharmapuri, Nilgiri, Salem, Tirunelveli, Tiruchirappalli, Tiruvannamalai, Vellore	[147]
<i>Wrightia tinctoria</i> R.Br./ <i>Tomentosa</i>	Kutajarista, Kutajavagadi lehya and Ayaskrti.	Dissolve stones in gallbladder, liver tonic, skin and dental problems, purification of breast milk, blood dysentery and piles, gonorrhoea, cure blisters	L, Sd, Rt, Ltx, Brk	Moist and dry deciduous forests, also in the plains. Very common in plains, scrub jungles and deciduous forests of hills up to 1500 m. Central and peninsular India. Throughout India except Jammu and Kashmir, Punjab, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Sikkim, Arunachal Pradesh, Assam, Nagaland, Meghalaya, Manipur, Tripura, Mizoram	[133,143,149,150,16]
<i>Wrightia pubescens</i>		The roots and leaves are used to treat injury and cuts, and the fruits are used to cure pulmonary tuberculosis. A blue dye is extracted from the leaves	Rt, L	Western Ghats, dry Deciduous Forests	[121-124]
<i>Wrightia sikkimensis</i> / <i>Coccinea/Laevis</i>		Fractured bone	WP	Sikkim hills	

*Therapeutic uses: Ayurved, Yunani, Sidhha, Tibetan, Folk, *Parts used: Fl - Flower, Ft - Fruit, Sd - Seed, St - Stem, Rt - Root, AP - Aerial part, WP - Whole plant, Brk - Bark, L - Leaves, Ltx - Latex

Table 2: Broad categories of diseases/problems and the no. of plants in folkloric uses with the percentage of use

Disease category	Number of plants in traditional uses	% activity
Antidote (snake, scorpion, insect, rodent, dog)	6	14.28
Skin diseases (eczema, dermatitis, pruritis, rashes, allergy)	23	54.76
Leprosy	11	26.190
Leukoderma	1	2.38
Venereal diseases	3	7.14
Diarrhea/dysentery	17	40.476
Ulcers (mouth/stomach/intestinal)	11	26.190
Rheumatism/arthritis	7	16.66
Eye diseases	6	14.28
Earache	5	11.90
Dental/gum problem (toothache, cavity, pyria, gum swelling)	8	19.04
Anthelmintic/worm infestation	12	28.57
Stomachache	12	28.57
Piles/hemorrhoids	7	16.66
Diuretic/renal complication	6	14.28
Indigestion	8	16.66
Pain reliever (abdominal pain after delivery, joint or bone pain, inflammation, neuralgia)	15	33.33
Menstrual/gynec complaints	5	11.90
Galactagogue/improve breast milk	6	14.28
Easy delivery and pain reliever	7	16.66
Leucorrhoea	3	7.14
Abortifacient	4	9.52
Gonorrhoea	5	11.92
Syphilis	3	7.14
Malaria/insect repellent	8	19.04
Fever	17	40.47
Cut and wounds (injuries and infection)	16	38.09
Respiratory problems (asthma, bronchitis)	12	28.57
Tuberculosis	5	11.90
Aphrodisiac	3	7.14

decoction is administered orally with a pinch of pepper powder twice a day for 3 days in fever.^[2,9] Andhra people in India use it for snake bite, diabetes.^[10,11]

Aganosma cymosa

Traditional uses: The plant is traditionally used as an emetic and anthelmintic. It is also used in the treatment of bronchitis, leprosy, and skin diseases. Flower-borne constituents are effective against diseases of eyes.^[13] *A. cymosa*, *Corallocarpus epigaeus*, and *Randia dumetorum* were found to be preferred by more than 70% of tribal doctors to treat snake-bite in Yanadi tribes, Chittoor, Andhra Pradesh, India.^[14,15] It has analgesic, antidiarrheal, antidiabetic, anodyne, and sedative properties. Also used for paraplegia, sciatica and neuralgia.^[15-19]

Aganosma marginata

Traditional uses: Used as emmenagogue, fever, tonic and urogenital problems by Andaman and Nicobar tribes.^[20]

***Allamanda* spp.**

***Allamanda cathartica* (Vernacular name: Alokandana, golden trumpet vine)**

Traditional uses: Latex used as a scabicide and in lice control. The infusion of the flowers is purgative and is also used as an anthelmintic, and as a topical agent, it is used to reduce hyperthermia. The stems are used against hepatic tumors. It is used as febrifuge by Andaman tribes.^[21] The leaves are boiled

and the vapor is inhaled to clear the nasal passage. Leaf and root decoction used as a laxative and emetic. It is used to cure malaria and jaundice. Decoction of the leaves, root, and flowers is used in the preparation of a powerful cathartic, purgative and a violent emetic in a number of tropical countries but large doses are toxic;^[22] the milky sap is also known to possess antibacterial and possibly anticancer properties. Leaf decoction in small doses used as antidote for poisoning. Found effective in the treatment of liver tumors. The bark and its decoction are reported to be administered as a hydrogogue in ascites. Aerial parts of *A. cathartica* are pounded into a paste with water and applied topically in the infected area to treat ringworm infection.^[23]

***Alstonia* spp.**

***Alstonia scholaris* (Vernacular name: Saptarni/dita bark, Saitan ka Jhad, Chhatim, and Devils tree)**

Traditional uses: Ayurvedic use is found in phosphaturia and as a blood purifier. Stem bark is given to chew during snakebite by the people of Narasimharajapura taluk in Chikmagalur district of Karnataka, India.^[24] Stem or bark is cooked with rice and taken every morning 7-14 days for leukorrhea by Siddhis of Kannada.^[25] Bark used for cholera by Tharu tribes of Uttarakhand India. Fresh bark 8-10 g soaked in 500 ml water mixed with powdered seed 1 g of *Piper nigrum* Linn. is taken orally 100 ml after breakfast in the treatment of appendicitis. The extract is also taken in tuberculosis.^[23] Paste of leaf and stem bark is mixed with the leaves of *Vitex negundo* and *Dodonaea angustifolia*. The paste is applied to the swellings. Latex is used for abortion.^[25] The plant is traditionally being used in debility, arthritis, impotence, cut, wounds and earache, asthma, leukorrhea, dog bite fever, cancer, tumor, jaundice, hepatitis, malaria, skin diseases, and diarrhea in Mizoram tribes.^[26] Indian villagers and tribes also use the plant for leprosy, mental disorders, cardiopathy, helminthiasis, pruritus, agalactia, hypertension, dental or gum problem, abdominal pain after delivery and swelling.^[27-32] Leaf used as aphrodisiac, antidote to poison, abortifacient, astringent, thermogenic, cardiotoxic, stomachic and expectorant, 2-3 drops of latex is given with water during abdominal pain in delivery; root decoction mixed with *Melia Azadirachta* root bark given in ulcer; ginger seed paste applied in swelling by Nyshi tribes of Arunachal Pradesh, India.^[28] *Alstonia* leaf for headache, latex applied in allergy and abscess, bark against stomach troubles Riang tribe of Cachar district, Assam, India.^[29] Stem bark of *Alstonia* used in malaria and inflammation in Dibang valley Assam, India. Latex (20 ml) mixed with water and sugar used in asthma by in Sonitpur Assam, India.^[30] Bark infusion taken by Warlis of Dahanu women to improve lactation.^[31,32]

Alstonia rostrata

***Alstonia venetum*: Vernacular name - Analivegam (viper repellent)**

Traditional uses: It has its utility in the treatment of viper bite. Root has indane alkaloids, giving psychopharmacological

properties to them.^[33] Roots used for wound healing by Irula tribes. Milky latex is used to heal cuts and wound. Used as a sedative and to treat hypertension. The species has fragrant flowers and is grown as a honey plant.

***Anodendron paniculatum*: Vernacular name: Andamanese bowstring plant/Indian Mallow, theikelki, bada dudheli mal**

Traditional uses: Raw leaves and fruits are eaten for jaundice/hepatitis in west Mizoram tribes. Paste of bark is applied on cuts and wounds by tribes of Koraput district, Odisha, India.^[34] Used to treat dyspepsia among South Indian tribes. Stem bark extract is tied over fractured bone by Andamanese tribes. Stems used to prepare bowstring and cordage by tribes of Andaman and Odisha. It is traditionally used for dementia. Act as antipyretic, antifertility and antirheumatic.

***Beaumontia* spp.**

***Beaumontia khasiana*: Easter lily vine, Herald's trumpet, Nepal trumpet-flower**

Traditional uses: India is home of Herald's trumpet. It is found to possess abortifacient effects and show loss in libido action. The roots and leaves are used in the treatment of fractures, injury, and backache and leg pain caused by rheumatism.

***Carissa* spp.**

***Carissa carandas/Carissa congesta*: Vernacular name - Karaunda**

Traditional uses: Fresh roots are crushed with roots of Aar (*Mimosa hamata*) in equal amount and filter it; 5 ml of the filtrate is given twice a day in dysentery.^[35-37] 5 g dry root powder is mixed in water and given twice a day in stool.^[38-40] Small tree/shrub leaves and root decoction are used for diarrhea, dysentery, cold, and fever of children.^[41] Fruit eaten to promote appetite. Decoction of root is given to woman to relieve from delivery pain after child birth. Latex is applied on lips to protect them in winter.^[42] Root paste of *C. congesta* kept on molar tooth, chewed and its remnant is applied on scorpion stung part by Bhilla tribe of Maharashtra, India. *C. carandas* root paste mixed with mustard oil used to treat muscular pain by Santhal and Munda tribes of Danapur district of West Bengal, India.^[43] Powder of fruit and black pepper is taken with honey to cure bronchitis and asthma by rural communities of Shahjahanpur district, Uttar Pradesh, India.^[44]

***Carissa spinarum*: Vernacular name - Jungle karaunda**

Traditional uses: Fresh roots are crushed with roots of aar (*M. hamata*) and filtered; 5 ml of filtrate is given twice a day in dysentery. Fruit and latex used in mouth ulcer and ENT problems by Irula tribes. 7-8 raw fruits are eaten to get relief from severe constipation in Dangri, Jammu and Kashmir, India.^[45]

Chonemorpha grandiflora/Chonemorpha fragrans/Chonemorpha macrophylla/Chonemorpha griffithii/verrucosa: Vernacular name - Moorva, madhuras, gokarni, peeluparni, madhulika, sravaa, garbhedareo

Traditional uses: Entire plant, roots, and the root bark are used for fever and stomach disorders. Used gynecological problems in Mizoram, infusion of roots taken internally against retained placenta; 100 ml twice daily useful in vitiated condition of vata and kapha, skin diseases, leprosy, scabies, syphilis, dyspepsia, flatulence, colic constipation, helminthiasis, hyperdipsia, urethrorrhea, hyperacidity, cardiac debility, diabetes, jaundice, cough, bronchitis, and intermittent fever. Powdered root and stems act as laxative, and in biliousness. Plant boiled in milk is given for diarrhea in children.^[46] It has antiparasitic properties. Entire plant, roots, and root bark are used for fever and stomach disorders. The plant is useful in treatment of skin diseases and inflammations. It acts as laxative, antibilious, and useful in treating fever, skin disorders, anemia and jaundice and muscle relaxant properties. Leaf extract with water is rubbed over the head for malnutrition. Plant extract is given as a digestive and general tonic to children, also used against snakebite.^[46] *C. macrophylla* leaf is eaten in Assam, India.^[47]

***Ervatamia* spp.**

Ervatamia/Tabernaemontana/Coronaria: Vernacular name - Chandni, Tagaar, Grape jasmine, crepe gardenia

Traditional uses: Root and bark infusion of the plant and *Leucas aspera* leaves with roots of *Ocimum adscendens* and bark of *Artocarpus* mixed with milk and butter are filtered and used in snakebite by the local medicine men of Bhadra wildlife sanctuary, Maland region of Western Ghats, India.^[48] Root paste is administered with buttermilk for sore eyes by the people of Narasimharajapura taluk in Chikmagalur district of Karnataka, India.^[49] *Tritocleis microphylla* is used in Indo-China for its emollient and laxative properties. In China, the plant is used against rheumatoid arthritis and is applied to boils, swellings, sprains, and bruises. The latex of *Tabernaemontana* coagulates into a resinous rubber. Leaf powder and stem bark along with the stem bark of *Ficus benghalensis* Linn., *Madhuca longifolia* macbr., and *Strychnous nux-vomica* Linn. are heated with coconut oil and applied externally to cure skin diseases.^[50] The wood is refrigerant. The roots are astringent. A decoction is used in the treatment of diarrhea and various abdominal complaints. An infusion is applied as a remedy for jungle fever. The roots are used in modern medicine to treat hypertension, headache, and scabies. The pounded roots are applied to sore eyes. The root is employed as a local anodyne and chewed for the relief of toothache. The pounded leaves are an ingredient of a cough medicine taken as an infusion. An infusion of the leaves is used to treat gripe (influenza). The flowers, mixed with oil,

are applied to sore eyes. The latex of the leaves is used as a cooling application for wounds to prevent inflammation.^[9]

Ervatamia/Tabernaemontana/Heyneana: Vernacular name - Paalai

Traditional uses: Powder of leaf and stem bark along with the stem bark of *F. benghalensis* and *M. longifolia* is heated with coconut oil and applied externally to cure skin disease. Latex is taken along with the latex of *Carica papaya* and *A. scholaris* to induce abortion.^[51] Bark decoction is recommended for jaundice. Leaf paste with milk is applied for chronic herpes. Small bark piece cooked with rice is taken to normalize body functions. Leaf paste is applied for pain and tenderness of rheumatism. Leaf paste with raw rice seeds is applied for lymph node enlargement. Leaf paste with rice washed water is applied for mastitis, tonsillitis, and mumps. Latex is applied for whitlow, cuts, and wounds. Leaf (dried in sunlight and fried) powder is applied for scabies. Bark extract is taken once in the morning for 5 days in case of intestinal worms. About 20 drops of latex poured into half lemon is given to eat once in the morning for jaundice. Decoction of its stem bark and *Trachyspermum ammi* seeds powder is recommended for diarrhea in cattle. Bark, *Zanthoxylum rhetza* bark, *Tabernaemontana divaricata* root, and *Capsicum frutescens* fruit ground with lime juice is consumed for throat pain and phlegm.^[52] Mixture of its leaves with *Allophylus cobbe*, *Pavetta tomentosa*, and *Indigofera tinctoria* is applied for 3 days in case of erysipelas and eczema. Bark is chewed (kept in mouth for half an hour and then gargled with water) for tonsillitis, pharyngitis, and laryngitis. Leaf paste is applied for ulcers due to burn. Stem bark decoction is used for cleaning cuts and wounds before dressing them by Siddhis of Kannada.^[53] Leaf paste applied externally twice daily for 4-5 days on wounds, bark juice and leaf paste dropped into nostrils only once against snake/scorpion bite and rheumatism.^[54]

***Holarrhena* spp.**

Holarrhena antidysenterica: Vernacular name - Tellicherry Bark (English) Kutaja/Bitter oleander/Dudhi/kuda/indrajau/khurna/koraya

Traditional uses: Bark with boiling water cure diarrhea, stomachache, and leukorrhea.^[55] *Holarrhena* paste/dried powder of leaf are applied to breast of nursing mothers to increase milk.^[56] Powder of bael fruit, bark of Khurchi, and Madhuricaa or Saunf givem with isapghol is given in acute and chronic dysentery by the people of Rajasthan, India. Sold as antidysentric in streets of Tamil Nadu, India.^[57] Paste/powder of stem, root, leaf, bark used by Indian Vaid and Santhal and Oraon tribes of Dinapur, West Bengal for dysentery, piles, leprosy, colic, dyspepsia, chronic chest complaints, spleen diseases, jaundice, bilious, and calculi.^[58] Siddhis of Kannada take root or stem decoction daily to act as depurative, stem latex smeared in forehead against severe

headache, smoking beedies of the leaves act as antivenom. The roots rubbed on a stone with a few drops of water and the paste obtained is given internally and applied externally in snakebite in Sundargarh District, Odisha, India.^[59] Decoction of bark gives the relief from blood dysentery and digestive troubles.^[60] Chewing of the leaves gives relief from toothache. Powder of seeds is used for the treatment of the accumulation of worms in the intestine. The leaf and root powder are taken by women after delivery to control menstrual cycle. Seeds are roasted and made a fine powder. One pinch of it is taken in water for 2-3 days in burning sensation. It is helpful in diabetes management. It is also used in asthma, skin diseases and rheumatic pain, used for acne treatment.^[61]

Holarrhena pubescence: Vernacular name - Kodasiga/kutaja

Traditional uses: Mundas use root and leaf in condition of excessive hemorrhage after childbirth. Ethnic Communities of Abujh-Marh (Madhya Pradesh) find bark useful in menstrual difficulties. Many tribal communities of India use different parts of the plant in various diseases. Fruit bark pounded and mixed with sesame orientale oil and massaged in rheumatic pain. Latex along with stem bark powder is taken orally for 3 days in skin disease by tribes of Raigarh, Chhattisgarh, India. The plant is mentioned in Garuda Purana for easy delivery. For the treatment of ringworm infection, root paste with neem bark and *Trichosanthes cucumeriana* leaves is applied externally in infected parts by rural folk of Bhadravati, Karnataka, India. Rauwolfia roots (15 g) along with roots of *Cassia tora* and *Haemanthus pubescens* paste applied twice a day for 2 days for snake, animal or insect bite by Khamptis of Arunachal Pradesh, India. Used in high fever, piles, asthma and digestive problems. Also used in skin diseases and rheumatic pain. Handful of bark ground in 1 L water given orally once daily to increase milk production.^[62] Stem bark used to treat dysentery and stomachache by Malasar tribe. The Santals use bark to check excessive menstrual flow and the bark and seeds are antiperiodic and useful after delivery to give proper tone to vagina; approximately 10 g of bark powder is given with cup of water to ease delivery.^[63]

Ichnocarpus spp.

Ichnocarpus frutescens/Polyanthus: Vernacular name - Black Sariva/Siamlata/Kali dudhi/black creeper/dhudhilata

Traditional uses: *Ichnocarpus frutescens* considered as a substitute for *Hemidesmus indicus* (Indian Sarsaparilla).^[64] It is used in the indigenous system of medicine in the treatment of fevers, gout, rheumatism, arthritis, epilepsy, venereal diseases, herpes, and skin diseases.^[24,65,66] Moreover, it is claimed for the treatment of atrophy, convulsions, cough, delirium, dysentery, measles, splenomegaly, and tuberculosis. It is also used in the abdominal and glandular tumors and its roots are used as alterative, antidycentric,

antipyretic, demulcent, diaphoretic, and hypoglycemic.^[67,68] Sariva secure the fetal growth with advantage. The roots of *I. frutescens* are given to treat rheumatic pain. Decoction of whole plant, roots is used as blood purifier.^[69] Root decoction (5 ml) is given twice a day for 1 month to improve memory power. Decoction of leaves is given in fever. Leaves boiled with oil and given for headache, fever and wounds between fingers by Malamalar tribes of Kerala, India.^[70] The Gond tribes use the roots as remedy for jaundice. The Palliyar tribe, inhabitants of the Saduragiri hills, Western Ghats, Tamil Nadu, India; use root of this plant to treat diabetes and also to eliminate stones in the gall bladder. The roots of *I. frutescens* along with roots of *Cissampelos pareira*, *Bauhinia vahlii*, and *Ardisia solanacea* are processed together and given orally to cure stomach cancer. Dried root powder of *I. frutescens* is used as galactagogue and is administered about 10 g twice a day with a glass of fresh water after the meals.^[71] The leaf is given to treat fever and root paste is applied in the rat bites and skin diseases. The roots of the plant are used as diuretic and diaphoretic. Root decoction with honey taken orally help increase milk production for women and also relief general weakness. Leaf paste applied on wounds and sores between fingers for cure.^[72] The stalks and leaves are used in the treatment of skin eruptions and fever. The tribal's of Madhya Pradesh and Siddis of Uttara Kannada district of Karnataka use the roots and flowers as a cure for diabetes, for this about 10 flowers are chewed and the juice swallowed every morning. Leaf latex is externally applied for skin infections.^[73] Leaf of the plant is used by the tribes of Chitrakoot, Madhya Pradesh on cuts to stop bleeding. Bark extract mixed with root bark of *Ziziphus rugosa* with 1-2 spoonful sugar twice daily in urinary disorders by the tribal/nontribal people of Tripura.^[74] A fine, strong fiber obtained from the inner bark is used in making ropes and sacks. The seeds are used for the treatment of rheumatism and the stem and leaves for acute urticaria.^[75]

Kopsia spp.

Kopsia fruticosa/Arborea

Shrub/Bush vinca

Traditional uses: All species of genus kopsia constitute indole alkaloids so it can produce central nervous system (CNS) effects. It is used to treat sore and syphilis and has cholinergic effects. Used to treat malaria. Antimicrobial, antifungal, and cardiac effects anticancer effects are shown by few Kopsia species.^[76,77]

Nerium spp.

Nerium oleander/Indicum: Vernacular name - Korobi/lal kaner/kanali Raktapushpa, Raktaprasava, Ravipriya (Red flowered variety)

Traditional uses: Ethnic communities of Jharkhand employ stem and root as abortifacient; while some tribal societies of

West Bengal and Haryana use latex in various diseases. Root bark paste is applied for scabies with itching sensation and eczema. Purified root extract is recommended for leprosy and septic carbuncles. Latex is applied for piles and tumorous growths.^[78,79] Root paste with water or buttermilk is applied for bleeding piles. A small quantity of its root extract heated with gingelly oil is given for easy delivery. 100 flower buds and 100 pepper seeds boiled in two liters of gingelly oil are applied for scabies and blisters.^[80] Nerium root, *Luffa acutangula* seeds, turmeric, seed coat of cashew nut and seed pulp of *Ricinus communis* are ground with gingelly oil and applied externally for warts and ringworm. Root (800 g), gingelly oil (400 ml), cow urine (800 ml), *Plumbago zeylanica* root and coriander seeds (50 g each) are boiled together and resulting oil is applied for eczema, impetigo and other skin diseases. Root paste with water is applied for chronic ulcers.^[81] Used in leprosy, skin diseases and eye troubles, leaves/roots are used as an antidote to snake bite, leaves cooked in mustard oil are rubbed on body in allergy, snuff of dry leaves is used in headache by people of Kunihar forest, Himachal Pradesh, India.^[82] Also used in fever, cancer and worm affections, as aphrodisiac and as antidote to snake bite by the Chatarra block of district Sonebhadra, Uttar Pradesh, India.^[83,84] Leaves as an antidote used by Kunihar tribe of Solan Himachal Pradesh, India.^[85] A green dye from the flower is used in the treatment of skin diseases and also possesses wound healing and anti-inflammatory property. The plant is used for the treatment of malaria and respiratory problems in local folklore medicinal systems. The juice prepared from the stem bark of *Nerium indicum* is used to cure ear pain in the traditional therapeutic systems in the Kancheepuram district of Tamil Nadu, India.^[86] Leaf against skin diseases in Cachar district, Assam, India. *N. indicum* (white flowers) roots ground and fried in ghee are applied externally on the ear of the patient to cure inflammation 13, root used in syphilis.^[87] Fresh twig as a toothbrush every morning avoids bad breath and toothache called Misvak is used in Rajouri district, Jammu and Kashmir, India.^[88] Santhal tribes used the plant for treatment of leukorrhea and menorrhagia.

Nerium odorum/N. indicum soland (white flowers): Karavira, Viraka, Ashvamarka, Hayamaara, auripushpa, Siddhapushpa

Traditional uses: Charka mentioned its use externally in leprosy. Sushruta prescribed its application in alopecia. Root powdered with water was applied to alleviate venereal diseases. The powder of leaves was used as a snuff for treating epilepsy. Internal use of any part is highly toxic. Tincture of flowers exhibited cardiotoxic; root is CNS-active and has spasmolytic activity. In homoeopathy, tincture of *N. oleander* (red laurel) leaves is used in diseases of nervous system, hemiplegic and paralytic conditions (epileptic).^[89,90]

Ochrosia/Ecllipta/Oppositifolia

Traditional uses: Used in gynecological disorders by Nicobarese people.^[91]

Parameria laevigata

Traditional uses: All parts of the plant are used to treat rheumatism, nephritis, and injury. The leaves are emmenagogue. An infusion is taken internally to facilitate the flow of menses. The leaves and twigs are pounded then applied as a poultice on cuts and lacerations. Bark is used internally in the treatment of dysentery, tuberculosis, and is drunk after childbirth to help shrink the uterus. The latex is febrifuge, stomachic, and a general tonic. Macerated in oil and applied externally on wounds.

Parsonsia alboflavescens

Traditional uses: The leaf is applied to leg swellings, disinfectant, tuberculosis, vulnerary febrifuge, rheumatism, and kidneys.^[92]

Plumeria spp.

Plumeria acuminata: Vernacular name - Gulachin

Traditional uses: Decoction of bark and Latex is used as purgative, cathartic and febrifuge and used to treat itch. The material may be taken as cooling tea for prevention for heart stroke. 12-24 g of dried material is used as decoction for controlling dysentery and diarrhea during summer season. The latex is mixed with coconut oil warmed and applied to affected area to treat arthritis, rheumatism, and pruritic skin lesion. Decoction of the bark is used as counter irritant on the gum for toothache. The juice, latex is rubefacient in rheumatic pain. Decoction of leaves is applied for cracks and eruptions of the soles of the feet. Infusion or extract from leaves is used to control asthma.^[93] Stem bark, leaves, and flowers are used as stimulant; decoction used as purgative, cathartic, febrifuge, and emmenagogue; used in dropsy and venereal affection. Poultice used for dispersing hard tumors. Latex is used as rubefacient, purgative, cathartic; used to treat itch, rheumatism and gum troubles. Flowers are eaten with betel leaves as febrifuge.^[94-98] *P. acuminata* used against stomach troubles by Bengali tribes of Cachar district, Assam, India. It is mentioned as abortifacient.^[99]

Plumeria alba/Frangipani: Vernacular name - Jasmine/Gulachin/chameli/golanchi Pagoda tree/kathgolap/temple tree/golapi kathgolap

Traditional uses: Different parts of the *P. alba* were believed, have been useful in variety of diseases namely the diseases of Malaria, Leprosy, antihyperthermic, venereal infections, Rheumatism, and abdominal tumors. The milky sap of the stem and leaf is applied to skin diseases such as herpes, scabies, and ulcers. Its bark is used as plaster over hard tumors, the seeds in hemostasis while the latex is used as purgative, cardiotoxic, diuretic, and hypotensive.^[100] Leaves are useful in inflammation, rheumatism, bronchitis, cholera, cold, and cough and also useful as being antipyretic, antifungal, and stimulant.

Plumeria obtusa

Traditional uses: In Asia, a decoction of leaves of *P. obtusa* is used for treating wounds, gastric ulcer and cancer and skin diseases. Its latex and bark are known to have purgative and diuretic properties.^[101]

***Plumeria rubra*: Vernacular name - Kathchampa**

Traditional uses: The decoction of the bark and roots of *P. rubra* is traditionally used to treat asthma, promote menstruation, and reduce fever. The latex is used to soothe irritation, abortifacient, and galactagogue.^[102] Fruit (follicle), seed paste is grounded to a fine paste and given internally on empty stomach to improve secretion of mother's milk.^[103] The leaves are used in ulcers, leprosy, inflammations, and rubefacient.^[104] Latex kept in sunlight on a copper plate is applied for ringworm. Bark paste is used in limited doses as a laxative. Bark decoction is laxative property in limited dose (larger dose results in severe purgation). Bark cooked with rice is taken for jaundice, venereal diseases, and joint pain (it is a strong purgative and hot in nature. Latex mixed with equal quantity of coconut oil is boiled and is applied for cuts and wounds. Oil prepared from plant juice is applied for chronic wounds and ulcers. Latex mixed with human urine is applied for pit viper bite. Dried flower powder paste is applied for snake bite. Latex and Hibiscus leaf juice are applied to a cloth thrice and dried. This cloth soaked in coconut oil is applied for eczema. *P. rubra* latex applied directly on blisters and sores, Bark decoction taken to kill intestinal worms. Bark boiled in water relieves loose motions and leaf juice is applied over fractured bone by Nicobarese people.^[105]

Rauvolfia* spp.**Rauvolfia serpentine*: Vernacular name - Sarpagandha/Gandhanakuli Nagagandha**

Traditional uses: Roots and leaf buds are crushed with milk and made into a paste and used internally and externally on the affected area by the medicine men of Bhadra Wildlife sanctuary, Karnataka, India. Rhizome and root decoction is given orally by the rural people of Kanyakumari district, Tamil Nadu, India. Leaf paste is given by the rural communities of Shahjahanpur district, Uttar Pradesh, India. Squeezed root is tied on the snake bitten area in Narasimharajapura taluk in Chikmagalur district of Karnataka, India. It is used as an antidote to snakebite by the Chatara block of district Sonbhadra, Uttar Pradesh, India.^[106] Jaunsari tribes of Uttarakhand use roots for fever, anxiety, epilepsy, intestinal, and nervous disorders.^[107] Leaf paste is given in snakebite and spider bite.^[108] Extracts of the roots are valued for the treatment of intestinal disorders, particularly diarrhea and dysentery and also as anthelmintic in Kalahandi district, Odisha, India.^[109] Mixed with other plant extracts, they have been used in the treatment of cholera, colic, and fever. The root was believed to stimulate uterine contraction and recommended for use in childbirth in difficult cases. The juice of the leaves has

been used as a remedy for opacity of the cornea.^[110] Root ground with tender coconut husk juice is applied for herpes. Root decoction is recommended to lower the high blood pressure.^[111] Root is made into pills with *Glycyrrhiza glabra* rhizome and is used for insanity and anxiety. Root decoction/paste is taken for fever and insect bite, scorpion bite, and snake-bite.^[112,113] Root cooked with rice is given for rabid dog bite, and root paste is applied for urticaria and rashes. Root paste is applied externally for swellings. Root ground with lime juice is applied to the center of head for sleeplessness, biliousness, anxiety, and other mental problems. Root and leaf ground in rice washed water is applied for septic wounds and ulcers. Root, *Aristolochia indica* root, *Crinum asiaticum* tuber, sandalwood and *G. glabra* rhizome ground in *Centella asiatica* juice, *Evolvulus alsinoides* juice, *Bacopa monnieri* juice and cow urine are made in to pills. These pills ground in *Coccinia grandis* leaf juice or fresh milk is applied for insanity and mental problems. Extract of its root along with that of *Caryota urens*, *Thottea siliquosa*, *Ruta graveolens*, and *Chassalia curviflora* (in equal quantity) is consumed for food poisoning. Root paste with lime juice is applied for scabies. Root, which of *Croton laevigatus* and *Acacia caesia* ground with *Citrus aurantium* fruit juice is applied thrice a day for herpes.^[114] Root paste with that of *Uvaria narum* and tender coconut husk juice is applied for herpes and urticaria.^[115] *R. serpentine* crushed roots mixed with water taken by Nyishi tribes of Arunachal Pradesh, India to lower blood pressure.^[116,117] It is mixed with ishwar mul as antidote to snake bite Santhal tribe of Dinapur, West Bengal, India. Roots of *Rauvolfia* used in hypertension in Dibang valley, Assam, India. The root paste is mixed with *Cinnamomum tamala*, tejpaat, and externally applied on leukoderma in night.^[118]

***Rauvolfia tetraphylla*: Vernacular name - Patalagarudi/Sarpagandhi/Pambukolli**

Traditional uses: South Indian state of Kerala, Karnataka, and Tamil Nadu Tribes variedly use *R. tetraphylla* plant as follows; Roots used to stimulate uterine contraction in case of difficult delivery, decoction of shoot is drunk three times a day for stomachache, Juice extracted from the root is used to treat muscular and rheumatism pain, Leaf decoction is used against cough and cold, leaf paste is used for skin disease. Root paste is taken either with milk or honey on empty stomach twice a day for 21 days to cure mental disorders.^[119] To treat high blood pressure *R. tetraphylla* root extract is given to drink 2-3 times a day. The powdered root for 3 days treats ulcer and clear intestinal worms. An extract of the plant is mixed with castor oil to form a liniment for topical skin diseases. The plant is used to treat snakebite, insect sting, and animal bite. Root paste of *Cyperus rotundus* (100 g), whole plant paste of *Polygala arillata* (100 g), and root paste of *R. tetraphylla* (100 g) are mixed with local alcohol and cooked; the mixture is consumed in stomach distress. Juice extracted from leaves along with juice of *Andrographis paniculata* and *A. indica* with honey are used to cure malaria. Root of *R. tetraphylla*

along with root of *C. pareira* in equal quantities with water are taken orally twice a day for 5 days to treat malaria. Leaves and flowers of plant are consumed to treat asthma. Root paste of *Rauvolfia tripartita* plant and *A. paniculata* are used in itches, boils and eczema. The fresh root juice or dried root powder of this plant along with *Adathoda vasica* soaked in water is prescribed orally in respiratory problems. Root and leave juice for headache and fever, root juice is also taken with water to cure body ache and rheumatism. Root paste is applied in cuts, wounds or boils twice a day until recovery by the people of remote villages of Karnataka, India.^[120] Root paste (25 g) is fed to the victim of snakebite slowly by the people of Sundargarh district; Odisha, India.^[121,122]

Strophanthus/Caudatus wallichii

Traditional uses: Various parts of the plant are used as heart stimulant and to treat injury and snake bites. Bark and leaves are reported to contain cardiac glycosides. Seeds are poisonous.^[123] The seeds used as heart stimulant and diuretic.

***T. divaricata*: Vernacular name- Tagar/ Nandivrsah/Nandibattalu/Nandibattu/Nadibattal**

Traditional uses: Flower ground with cumin seeds is poured into the eyes for eye irritation and conjunctivitis. Flower or leaf juice alone is poured into the eyes in case of dust in eye. Root paste with lime juice is applied externally, and two spoon extract is taken internally for herpes. Root paste is applied for toothache. Root extract is consumed to expel intestinal worms. Leaf paste with salt is applied for mastitis in cattle. Leaf and raw rice seeds paste is applied around the furuncles for pus release. Root decoction is taken for polio. Bark decoction is used for biliousness. Bark paste is applied for septic wounds and ulcers. Leaf or bark paste is applied for hardened tumors or tubercles on the skin. Root paste with raw rice seeds is applied for 3-6 days for infectious swellings, septic furuncles, and ulcers. Two drops of flower juice are used as eye drop twice a day in case of conjunctivitis. Tender shoot tip tambuli is useful for increased body heat, swellings and digestive disorders in pregnant women. Root paste (stored in earthen pot for a day) along with raw rice is applied for septic swellings and furuncles. The water in which its flowers are soaked overnight is used to wash eyes in case of redness in eye, burning sensation and water release from the eyes. Root paste is applied for septic wounds and poisonous bites. Leaf paste is applied for skin diseases, to expel maggots and gum diseases. Paste of one handful leaf and one spoon cumin seeds is applied for furuncles. Extract of flower and tender shoot tip ground in breast milk is poured into the eyes in case of glaucoma. Flower and leaf along with raw rice seeds ground and applied around the furuncles for pus release and easy heal. About 5 spoon extract of its root and *Flueggea leucopyrus* root (equal quantity) ground with lime juice are given to women after 2 h of delivery to prevent infections (continued for 10 days).^[124] Root extract with lime juice is used both externally and internally for herpes, bark used as worm repellent and an antidote to snake bite by Assamese.^[125-127]

***Thevetia* spp.**

***Thevetia peruviana/Cascabella thevetia*: Vernacular name - Yellow oleander (peeli kaner)**

Traditional uses: In the Philippines and India, it has folkloric uses for several ailments. Mature seeds are used as an abortifacient, purgative, rheumatism and in dropsy, fruit latex is applied in nail infection, leaf paste mixed with castor oil and after little warming applied thrice daily for 2-3 days on external injuries as a pain alleviator in Kalahandi district, Odisha, India; a decoction prepared from the bark or leaves is applied in regulated doses to loosen the bowels, as an emetic, and is said to be an effective cure for intermittent fevers. A decoction of the seeds acts as a violent emetic, hinders respiration, and may cause paralysis of the heart. Pulverized seeds are sometimes an ingredient of suppositories to alleviate hemorrhoids by Nallamalais tribes.^[128] A bark or leaf decoction is taken to loosen the bowels, used as an emetic, and is said to be an effective cure for intermittent fevers. Leaf juice and infusion of root is used against snake bite by the ethnic people of Tripura, India.^[129] The roots are made into a plaster which is applied to tumors. In Thailand and India, the oil from the kernel is applied topically to treat skin complaints. In India, seeds have been used for committing suicide or homicide, used in intermittent fever and seeds to kill lice by Dibang valley, Assam, India.^[130]

***Trachelospermum jasminoides/asiaticum/axillare*: Vernacular name - Star jasmine**

Traditional uses: This plant is especially useful for the aged. The leaf is restorative and tonic. The flowering stem is analgesic, antibacterial, antispasmodic, depurative, emmenagogue, febrifuge, resolvent, tonic and vasodilator. A decoction is used in the treatment of rheumatoid arthritis, sore throats and various boils and abscesses. The flowering stem is analgesic, antibacterial, antispasmodic, depurative, emmenagogue, febrifuge, resolvent, tonic, and vasodilator. The seed is cardiotoxic and hemostatic. The whole plant is cooked with other foods and used to treat rheumatism. The seed is cardiotoxic and hemostatic.^[131]

Urceola micrantha

Traditional uses: The bark and roots are used for the treatment of infantile paralysis, rheumatism, injury, and fractures.

***Vallis solanacea/glabra/heyneae*: Vernacular name- Bakki, Bread flower (Chodhari bela), dudhibel**

Traditional uses: In India, the milky latex and plant paste is applied to ringworm infection, eczema, cut, sores, and wounds.^[132-135] Acts as antidote to snake and scorpion bite.^[136] Barks are chewed for fixing teeth, applied to wounds and sores. It has astringent effect and treats leprosy, sprue, dyspnea, and piles/hemorrhoids.^[137,138] One handful of leaves ground with 7 fruits each of pepper and long pepper and 5 leaves of piper

betel into paste given orally in bone fracture and also externally applied on fractured part with Ghee once daily for 3-4 weeks by in Shimoga district.^[139] Climber Stem part (Paste) is effective in Hanthi paon. Anticancer and antimalarial activity is seen. In Thailand young leaves, flowers and fruits are eaten.

***Vinca* spp.**

***Vinca major/rosea/Catharanthus roseus* (periwinkle): Sadabahar/nityakalyani**

Traditional uses: The decoction is also taken to treat malaria, dengue fever, diarrhea, diabetes, cancer, and skin diseases.^[140] Leaf juice (5 ml) mixed with honey is given in the early morning for continuous 7 days once a day to treat menorrhagia/leukorrhea.^[141-143] Extracts prepared from the leaves have been applied as antiseptic agents for the healing of wounds, against hemorrhage and skin rash and as a mouthwash to treat toothache.^[144] The aerial parts are also considered diaphoretic and diuretic, and decoctions are taken to relieve indigestion, dyspepsia, dysentery, toothache and the effects of wasp stings, and as an emetic, purgative, vermifuge and depurative, purgative and toothache. It is a potential anticancer plant, dry bark powder.^[145] Leaf juice is taken daily morning to lower blood pressure (BP).^[146] For menstrual complaint/leukorrhea, leaf infusion of *Catharanthus* given once a day by Bhil tribe, Maharashtra, India.^[147] It is applied on forehead to reduce headache Bengali tribes of Cachar district, Assam, India.^[148-150] *C. roseus* fresh leaf extract mixed with momordica charantia extract one cup daily to diabetic patient by the tribal/nontribal people of Tripura.^[151] It antiatherosclerotic.^[152]

Vinca pusilla Murr./tiny periwinkle: Sangkhi, Sangkhaphuli

Traditional uses: A decoction of the dried plant boiled in oil is used in the treatment of lumbago. Whole plant and roots are used to lower BP and blood sugar. Traditionally the roots, leaves, and latex of the plant are widely used to treat various conditions such as skin and liver diseases, leprosy, dysentery, worms, ulcers, leaf paste applied externally for tumor, and to relieve earache.^[153] It is known for its anticancer pain-relieving properties. Whole plant is used in paralysis.^[154]

***Wrightia* spp.**

Wrightia arborea: Vernacular name - Dhudla

Traditional uses: The latex is applied on cuts, wounds and skin allergy.^[155]

Wrightia tinctoria: Vernacular name - Sweet indrajao, pala indigo

Traditional uses: Bark powder mixed with curd and given to dissolve stones in gallbladder. Bark and seeds are used in jaundice and to protect liver.^[156] Leaf paste is filled into dental

cavities for toothache and cavities by Irula tribes. Leaf paste in coconut oil is applied for skin diseases. Leaf extract or paste in virgin coconut oil is applied for psoriasis. Leaf is chewed for toothache. Bark cooked with rice or its decoction is given for purification of breast milk. Leaf paste is applied for almost all types of skin diseases. Leaf paste with tender coconut husk juice is applied 5-6 times a day for septic wound and ulcers in feet.^[157] For mouth ulcers, a little cotton is dipped in the latex and applied on the mouth, thrice in a day for 3 days. Stem/root bark is used for piles and stem bark is cut into pieces, boiled in water to get decoction, a cup of decoction is given in orally, twice in a day for 10 days.^[86,158-161] Root extract or decoction is used for abscesses and rheumatism, leaf paste is applied for swellings, seeds boiled in milk are given for blood dysentery and piles.^[162] Its decoction is used for indigestion, fever and digestive disorders. Root extract in rice cooked water is applied for tonsillitis, rheumatism and toothache. Root bark and stem and leaves are antidote in Karveti Nagaram.^[163] Leaf juice mixed with lime and turmeric is applied externally to the swellings. Bark infusion given in stomachache by Bhilla tribe, Maharastra, India. Bark used for gonorrhoea. Crushed leaves and latex applied externally to cure blisters by Malasar tribes, Coimbatore.^[164]

Wrightia/Tomentosa: Bitter indrajao, dyer's oleander and jaundice curative tree

Traditional uses: Cures diseases of pittam and vatam, skin diseases, eczema, dysentery, psoriasis, venereal diseases, stringent, anthelmintic, stomachic, antipyretic, tonic, antidysenteric, diarrhea, piles, leprosy, worm Infestation, thirst, pain, diarrhea. Used for renal complications, menstrual disorders and amebic dysentery. Also acts as hemostatic and antipyretic and anticancerous. Wrightiadione is a valuable anti-cancer alkaloid. The bark of the stem and roots is regarded as an antidote against snake bites and scorpion stings.^[165]

DISCUSSION AND CONCLUSION

Modern lifestyle is prone to different health problems, the symptomatic treatment of modern science does not have answer for various illness related to body as well as mind. We lost many of the texts, references of this beautiful science during various invasions in India. Many drugs and formulations which are told in classics are still unknown to us.

Traditional knowledge and experiential database can provide new functional leads to reduce time, money and toxicity. These records are particularly valuable since ages as these medicines are time tested for thousands of years on people. India with its Ancient traditional health care system offers immense opportunities for natural product drug discovery and development based on traditional knowledge and clinical observations.

This study documents the folk medicinal plants of Apocynaceae family plants. This literature review offers some

insight to the range of diseases treated ethnomedicinally. The total number of 54 medicinal plant species with its description, distribution, vernacular names, and folkloric uses is reported in this study, summarized in Tables 1 and 2. Figures 1 and 2 show comparative/frequency of use of these plants/parts.

The various plant parts used for treatment included whole plant, leaves, roots, stems, barks, flowers, fruits, and seeds, latex, aerial parts, rhizome, and buds. Of the various plant parts used, seeds, latex, fruits, root, leaves constituted the majority of uses (69.047%), followed by root and stem bark (52.38%), stem (40.47%), seeds and flowers (23.8% and 33.33%, respectively) as shown in Figure 1. All plants have some effects in common such as antidote (to snake, scorpion, dog, insect bite), injury and inflammation, skin diseases, and GIT disorders. Different parts of the plants have medicinal value. For instance, whole plants of *Aganosma*, *Chonemorpha*, *Ervatamia*, *Hollarhena*, *Ichnocarpus* and *Kopsia* were used for treatment of coughs, rheumatoid arthritis, jaundice, skin diseases, edema, cancer, diabetes, and malaria, while leaves and latex were used for treatment of skin lesions; ringworm and fungal infections, ENT problems, toothache, ulcer. The stem and root and the barks of the same were used for treatment of eczema, itches, and toothache, leukorrhea, abortifacient, hypoglycemic and to lower BP. Diseases treated with Apocynaceae family plants included heart problems, cancer, edema, measles, allergy, pain, fever, menstrual problems, ringworm and scabies infection, emesis, sexual disorders, contraception, increase in milk production, hypertension, cuts and wounds, fracture or sprain, snake bite, scorpion bite, dog bite, rheumatic fever, dengue fever, head lice, nausea, vomiting, urinary tract problems, leukorrhea, hepatitis, jaundice, and anthelmintic [Tables 1 and 2].

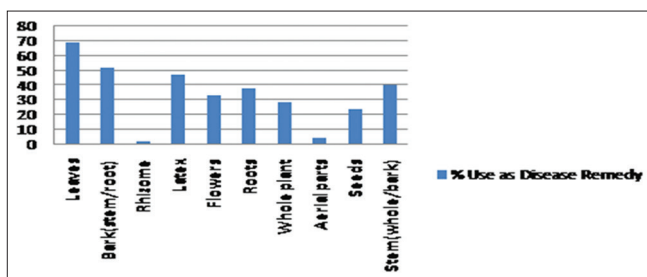


Figure 1: Percentage use of the plant of Apocynaceae species

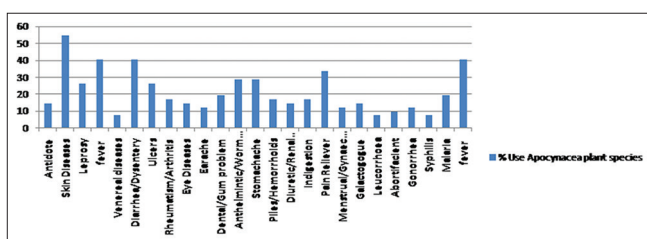


Figure 2: Major ailments/disease categories and percentage use of Apocynaceae species against them. Almost all plants are used in minimum 5 ailments

A number of the Apocynaceae family plants have reported bioactive properties, which validate their use in the folk medicinal system of India [Table 2]. *Catharanthus*, *Ichnocarpus*, *Rauvolfia*, *Holarrhena*, *Ervatamia* and *Nerium*, etc., has been reported to have enormous therapeutic potential, which might support the possibility of other plants of this family to follow similar ethnopharmacology. Anti-inflammatory, anticancer, antinociceptive, antimalarial, antiulcer, anthelmintic, antioxidant, wound healing, antidiabetic, etc., properties are reported in scientific literature, which again can justify its folk medicinal use in India for the treatment of other ailments as shown in Tables 1 and 2. In India, the applications of *Ervatamia divaricata* in traditional medicine are so numerous that the plant may well be classified as a panacea for gastrointestinal, urogenital and skin affections. *N. indicum* is used as traditional medicine in different parts of the world, especially in India and China. Its ethnomedicinal uses include in the treatment of diverse ailments such as cardiac illnesses, asthma, corns, cancer, and epilepsy, leprosy. Mosquitocidal triterpenes as well as antiplasmodial activity have been reported for, justifying its use as insect repellent and for the treatment of malarial fever in India. The plant species recorded in this study constitutes enough raw data for medicinal plants research.

The Apocynaceae family is rich in secondary metabolic products especially indole alkaloids, steroidal alkaloids, iridoids, triterpenes, cardiac glycosides, etc., which support the varied traditional medicinal use, further re-explored through various pharmacological properties in labs. The plants merit detailed Study/Research which can prove useful in the identification of “Hit” and discovery of “Lead” compounds leading to novel and more efficacious drugs. One interesting fact observed that almost all species of the Family produce drugs treating similar/common ailments. The total number of medical plant species around 50 are recorded by this study constitutes enough raw data for medicinal plants research. It is interesting to note that most of the plants mentioned in this article are recognized by the Ayurveda and Allopathic system as medicinal plants, while the Siddha, Yunani, Tibetan, and Homeopathy systems acknowledge the therapeutic properties of many of them. Traditional knowledge and experimental database can provide new functional leads to reduce time, money and toxicity. India with its varied heritage of traditional herbs and alternative health care systems offers immense opportunities for natural product drug discovery and development based on traditional knowledge and clinical observations.

Since “Dogbane Family” is Toxic plant’s family, issues of safety, efficacy and quality, access and rational use of the drugs should be seriously considered. Evidence from the study reflected a primitive state of ethnomedical research; confirmation has to be claimed using World Health Organization (1991) guidelines for standardization of herbal drugs and another alternative source of drugs in the interest of the masses using these drugs. The validation of these claims is important as it is the only way to appreciate the

contributions of ethnomedicine. Efforts should be made to conserve these species now facing the threat of extinction so that we can reap the benefits that abound in them.

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