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Ethnomedicinal Remedy for Gastrointestinal Disorders in Rural and Remote areas of Jammu and Kashmir: A Review

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ABSTRACT: Jammu and Kashmir has a rich heritage of medicinal plants. Inspite of this, gastrointestinal diseases especially diarrhoea is highly prevalent in Jammu and Kashmir with a rate of 32.8%, whereas the overall prevalence rate in India is 19.2%. Total 76 plant families are used for the treatment gastrointestinal ailments. Asteraceae family plants are the main contributor followed by Lamiaceae, Fabaceae, and Brassicaceae. The current study aimed to highlight the available ethnomedicinal plants in Jammu and Kashmir for the treatment of the gastrointestinal disorders. For this study, keywords like medicinal plants, diarrhoea, gastrointestinal disease, Jammu and Kashmir, and Ethnomedicinal plants were used for literature search in PubMed, Google Scholar, EBSCOhost databases. The changing of environmental conditions and over-exploitation may lead to the extinction of these ethnomedicinal plants. Therefore, Various Government and Non-Government Organisations (NGOs) have introduced different preventive measure and policies for the conservation of ethnomedicinal plants species. Now, there is need of collaboration of research communities and government agencies to create awareness among local people and attract pharmaceutical industries to use the medicinal plants for therapeutic purpose at a commercial level.

Keywords: Ethnomedicinal plants, Gastrointestinal disorders, Conservation, Jammu and Kashmir.

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INTRODUCTION

Since the prehistoric times, medicinal plants have been used to treat and cure different diseases. Due to the safety and security, these medicinal plants are given the first preference in the Indian healthcare system like Ayurveda, Siddha and Unani. The literature from Rigveda, 1500-400 BC is providing the attestable evidence of curative used of these therapeutic plants (Hassan *et al.*, 2018). From ancient time, India has been the rich repository of medicinal plants, and from ages, these plants are being used for healthcare purpose. Worldwide 4, 80,000 plants species have been discovered out of which 28, 187 species are used for the therapeutic purpose (Pullaiah *et al.,* 2015; SOTWP, 2017). About 9,500 plant species are found in India which has medicinal significance (Chowti *et al.,* 2018).

Jammu and Kashmir (J&K), part of the western Himalayas has around 2000 species of angiosperms, 12 species of gymnosperms and 90 species of pteridophytes (Shah *et al.*, 2015). The state is a rich reservoir of more than 572 therapeutic plant species (J&KFD, 2018). It harbours a large variety of medicinal plants that are used in the traditional human healthcare system from the past thousands of years. Traditional medicines remain the chief healthcare preference in numerous rural and remote regions. Due to the high cost of current drugs, people living in rural and remote areas use these ethnomedicinal plants for treating these general ailments.

In Jammu and Kashmir (J&K), many gastrointestinal disorders have been recorded and among which diarrhoea has been the most prevalent at the rate of 32.8%, though the general predominance rate in India is 19.2% (MedInd, 2018). As per Integrated Disease Surveillance Program (IDSP) India reports from 2014 to 2018 a total of 6969 instances of acute diarrhoea were reported from J&K, and out of these 3 deaths were recorded, though 1874 cases of gastroenteritis were also recorded as presented in Table 1 (IDSP, 2018).

Table 1: Reports of Gastro cases in Jammu and Kashmir from 2014-2018.

Year	No. of Diarrhoea Cases	No. of Deaths	No. of Gastroenteritis Cases	No. of Deaths
2014	3189	0	0	0
2015	1438	1	0	0
2016	531	2	816	0
2017	989	0	999	0
2018	812	0	59	0

Compiled from source: http://www.idsp.nic.in

In Ladakh province, stomach problems are common among individuals because of harsh climatic conditions and water-quality (Ballabh and Chaurasia, 2009). Regarding drinking water and sanitation; 59% of the population has piped drinking water, and 22% of people have flush toilets (MedInd, 2018). In India, J&K holds the fifth position on the basis of population, which is suffering from the health care crisis (MedInd, 2018). As per research report distribution of public healthcare services are not wise in the state (Sharma *et al.,* 2015). As Secondary and tertiary level healthcare service is easily accessible in Srinagar, thus patients prefer to approach them (Sharma *et al.,* 2015). The Jammu District covers the patients of the whole Jammu which impose the high stress on limited district hospitals. Moreover, the situation is worse in terms of healthcare institutions in other districts like Leh-Ladakh, Kargil, Ramban, Doda, Rajouri, Reasi (Sharma *et al.,* 2015). This review highlights the available ethnomedicinal plants that are commonly found and used in the rural and remote regions of Jammu and Kashmir for treating the gastrointestinal ailments.

A. Plant families contributing to curing gastro-intestinal problems

On surveying, the published literatures available on line on the databases like PubMED, Google Scholar, and EBSCOhost. Total 76 plant families have shown their contribution in treating gastro problems. The significant contribution has been shown by Asteraceae family (20 species); Lamiaceae (16 species); Fabaceae (12 species) and Brassicaceae (11 species) for treating the gastrointestinal ailments. Studies done by various research groups in J&K region on different ethnomedicinal plants have been listed in Table 2 (Dutt *et al.,* 2015; Lone *et al.,* 2012; Ballabh and Chaurasia, 2009; Rao *et al.,* 2015; Pandita *et al.,* 2013; Kumar *et al.,* 2015; Shah *et al.,* 2015; Kumar *et al.,* 2009; Singh and Bhellum, 2012; Bhatia *et al.,* 2014; Mir and John, 2014; Bhushan and Kumar, 2013; Wagay, 2014; Lone and Bhardwaj, 2013; Namtak and Sharma, 2018; Yousuf *et al.,* 2012; Malik *et al.,* 2011; Rashid, 2012; Kumar and Bhagat, 2012; Kumari *et al.,* 2013). All most every part of the plants play a critical role, but the major medicinal compounds are obtained from leaves (27%), whole plant (17%), roots (16%), seeds (9%), fruits and flowers (6%) respectively which has been illustrated in Fig. 1.

B. Indigenous knowledge among villagers and tribal people

As the traditional therapeutic framework is the primary human services given in numerous provincial and remote zones; thus, local as well as tribal people, likewise continue to share information for the utilization of medicinal plants. A study in Bandipora district reported that Bhoris ethnic group were the herbal medicine specialists of indigenous drug (Lone and Bhardwaj, 2013). Another study revealed that the rural female members were well versed with therapeutic knowledge than male as male members moved away for livelihood and female members dealt with common ailments (Shah *et al.,* 2015). Old members in the family have more knowledge of medicinal plants which is transferred by oral communication from generation to generation (Dutt *et al.,* 2015; Bhatia *et al.,* 2014; Rao *et al.,* 2015). However, in last few decades, this knowledge of ethnomedicinal plants is declining because of low enthusiasm of the young people in learning and acquiring knowledge about the ethnomedicinal plants and operational procedure (Dutt *et al.,* 2015; Bhatia *et al.,* 2014).

C. Organisations involved in the conservation and management of medicinal plants

As revealed by World Health Organization (WHO), therapeutic plants are the member of the indigenous health system and till now used by the substantial population in the majority of the developing nations (State Times, 2018). Keeping track of medicinal plants consumption different Government and Non-Government Organizations (NGOs) have started the conservation of endangered plant species. The Different associations of Jammu and Kashmir, for example, Indian Institute of Integrative Medicine, Jammu; Sher-e-Kashmir Agriculture University of Science and Technology, Jammu and Srinagar; Center for Biodiversity Studies, BGSB University, Rajouri; University of Kashmir, Srinagar; State Forest Research Institute, J&K; Defence Institute of High Altitude Research, Leh; Shri Mata Vaishno Devi University, Katra and University of Jammu and Department of Education-J&K are positively engaged in preserving and creating awareness about the available medicinal plants (Rather and Baba, 2015; Seshagun, 2018).

Table 2: Plants for the treatment of Gastrointestinal Disorders in Jammu and Kashmir.

Name of the plant species	Family	Local names	Plant parts used	Ailments treated	References
Aconitum heterophyllum Wall.	Ranunculaceae	Pateesh, Attee, Keripatis	Rhizome	diarrhoea, dysentery, stomach-ache, gastric inflammation	Dutt *et al.*, 2015; Lone *et al.*, 2012; Ballabh and Chaurasia, 2009; Rao *et al.*,2015
Bunium persicum (Boiss) B. Fedtsch.	Apiaceae*****	Kala jeera, Sahi zeera,	Seeds	diarrhoea, Indigestion, dysentery	Dutt *et al.*, 2015; Ballabh and Chaurasia, 2009; Pandita *et al.*,2013
Bupleurum falcatum L.	Apiaceae*****	Jard jeeri	Roots	stomach complaints	Dutt *et al.*, 2015
Bupleurum longicaule Wall.	Apiaceae*****	Neeli taari	Whole plant	colic and gastro-intestinal ailments	Dutt *et al.*, 2015
Capsella bursapastoris Moench.	Brassicaceae****	Gual	Whole plant	diarrhoea	Dutt *et al.*, 2015
Cardamine impatiens L.	Brassicaceae****	Buti	Leaves	digestive complaints	Dutt *et al.*, 2015
Celtis australis L.	Ulmaceae	Khiraku	Flowers	colic disorders	Dutt *et al.*, 2015
Cichorium intybus L.	Asteraceae**	Nilli dudhli, Kasni	Whole plant	diarrhoea	Dutt *et al.*, 2015; Lone *et al.*, 2012
Clematis montana D. Don	Asteraceae*	Ashroo	Leaves	indigestion	Dutt *et al.*,2015
Clinopodium vulgare L.	Lamiaceae**	Tulsi, Batak panjel	Whole plant	dysentery, abdominal pain	Dutt *et al.*, 2015; Kumar *et al.* 2015
Corydalis govaniana Wall.	Fumariaceae	Bhootjati	Roots	gastric pains	Dutt *et al.*, 2015
Corydalis rutifolia Sibth.	Fumariaceae	Bhooti	Whole plant	gastric pains	Dutt *et al.*, 2015
Desmodium polycarpon DC.	Fabaceae***	Phalli	Leaves	stomach ache	Dutt *et al.*, 2015
Desmodium tiliaefolium D. Don	Fabaceae***	Samber phalli	Whole plant	stomach ache	Dutt *et al.*, 2015
Erigeron canadensis L.	Asteraceae*	Shankhi	Leaves	diarrhoea, dysentery	Dutt *et al.*, 2015; Kumar *et al.*, 2015
Erodium cicutarium Leman.	Geraniaceae	Jillo	Whole plant	dysentery	Dutt *et al.*, 2015
Fumaria parviflora Lamk.	Fumariaceae	Pitpapra,	Whole plant	indigestion	Dutt *et al.*, 2015
Gentiana argentea Royle.	Gentianaceae	Neelkanth	Rhizome	indigestion	Dutt *et al.*, 2015
Lonicera alpigena L.	Caprifoliaceae	Lhaat	Leaves, Flowers	stomach complaints	Dutt *et al.*, 2015
Mollugo pentaphylla L.	Aizoaceae	Milli	Leaves	stomach complaints	Dutt *et al.*, 2015
Pedicularis pectinata Wall ex. Beth.	Scrophulariaceae	Tooti, Singi phool	Leaves	diarrhoea, dysentry	Dutt *et al.*, 2015; Shah *et al.*, 2015
Phytolacca acinosa Roxb.	Phytolaccaceae	Asaraal	Roots	stomach cramps and dysentery	Dutt *et al.*, 2015
Rabdosia rugosa	Lamiaceae**	Sullai	Leaves	stomach problems	Dutt *et al.*, 2015
Rorippa islandica (Oeder) Borbas.	Brassicaceae****	Shrrii	Whole plant	stomach ailments	Dutt *et al.*, 2015
Rubus niveus Thunb.	Rubiaceae	Keryarri	Leaves	dysentery	Dutt *et al.*, 2015
Salvia moorcroftiana Wall.	Lamiaceae**	Kaali jhari, Gankual, Sholur, Gaddo	Roots, Leaves	stomach pains, dysentery	Dutt *et al.*, 2015; Kumar *et al.*, 2015, Kumar *et al.*, 2009
Solanum surrattense Burm. F.	Solanaceae	Neeli kandayari	Whole plant, Roots	dysentery, abdominal pain and gastric troubles	Dutt *et al.*, 2015; Singh and Bhellum, 2015; Bhatia *et al.*, 2014; Shah *et al.*, 2015
Tagetus minuta L.	Asteraceae*	Ban- gutti	Flowers	griping of the stomach	Dutt *et al.*, 2015
Tanacetum longifolium Wall. ex DC.	Asteraceae*	Ban chai	Roots	stomach pain	Dutt *et al.*, 2015
Thymus serpyllum Auct.	Lamiaceae**	Banajwain, Jangli ajwain, Jangli javind, Javen, Tharu juain	Whole plant, Seeds	stomach ailments	Dutt *et al.*, 2015; Ballabh and Chaurasia, 2009; Kumar *et al.*, 2015, Rao *et al.*, 2015
Trachy spermum ammi L.	Apiaceae*****	Ajwain, Jawind	Seeds, Fruits	stomach pains, colic	Dutt *et al.*, 2015; Lone *et al.*, 2012

To be continued..

Name of the plant species	Family	Local names	Plant parts used	Ailments treated	References
Adiantum capillis-veneris	Pteridaceae	Hansraj, Tharkan, Gautheer	Whole plant	stomach pain	Pandita *et al.*, 2013; Mir and John, 2014
Ageratum conyzoites	Asteraceae*	Nili jadii	Whole plant	dysenteric, stomach ailments	Pandita *et al.*, 2013
Amaranthus viridis	Amaranthaceae	Chileeri	Whole plant	diarrhoea, dysentery	Pandita *et al.*, 2013
Brassica campestris L.	Brassicaceae****	Peeli sireaan	Seeds, Leaves	cholera	Pandita *et al.*, 2013
Brassica oleracea capitata	Brassicaceae****	Band gobi	Leaves	diarrhoea	Pandita *et al.*, 2013
Celosia argentea	Amaranthaceae	Kukad suel, Kukad siri	Flowers, Seeds	diarrhoea	Pandita *et al.*, 2013
Cicer arietinum	Fabaceae***	Chana	Seeds, Leaves	diarrhoea	Pandita *et al.*, 2013
Cucurbita pepo	Cucurbitaceae	Pahadi kandoli	Fruits, Leaves, Seeds	intestinal inflammation	Pandita *et al.*, 2013
Cuminum cyminum	Apiaceae*****	Zeera	Seeds	diarrhoea	Pandita *et al.*, 2013
Gloriosa superba L.	Liliaceae	Kukadsira, Kadiyanag	Tubers, Flowers, Leaves	colic	Pandita *et al.*, 2013
Hordeum vulgare L.	Poaceae	Jav	Grains	gastric ulcers	Pandita *et al.*, 2013
Opuntia ficus-indica - (L.)Mill.	Cactaceae	Trapad thor	Stem, Flowers	diarrhoea, colitis	Pandita *et al.*, 2013
Oxalis stricta	Oxalidaceae	Aamii	Whole plant	indigestion, stomach cramp	Pandita *et al.*, 2013
Parthenium hysterophorous	Asteraceae*	Ghajar, Congress gha	Whole plant	dysentery	Pandita *et al.*, 2013
Phaseolus vulgaris	Fabaceae***	Rajmah	Leaves, Seeds, Pods	diarrhoea	Pandita *et al.*, 2013
Sida acuta	Malvaceae	Baare aaudha	Whole plant	diarrhoea, dysentery	Pandita *et al.*, 2013
Tridax procumbens L.	Asteraceae*	Kumra	Leaves	diarrhoea	Pandita *et al.*, 2013
Triumfetta rhoboidea Jacq.	Tiliaceae	Dhumjoojdoo	Fruits, Flowers, Leaves, Roots	diarrhoea, dysentery	Pandita *et al.*, 2013
Typha elephanita Roxb.	Typhaceae	Aeera	Whole plant	dysentery	Pandita *et al.*, 2013
Woodfordia fruticosa (L.) Kurz.	Lythraceae	Daphi, Dahi, Dooh, Dhaeen	Leaves, Bark, Flowers	diarrhoea, dysentery	Pandita *et al.*, 2013; Bhushan and Kumar, 2013; Bhatia *et al.*, 2014
Aconitum heterophyllum Wall. Ex Royle	Ranunculaceae	Patris, Paewakh, Patris, Pivak	Rhizome, Roots	abdominal disorders	Wagay, 2014; Lone and Bhardwaj, 2013
Berberis lyceum Royle	Berberidaceae	Kawdach, Daruhaldi	Fruits	indigestion, diarrhoea	Wagay, 2014; Ballabh and Chaurasia, 2009
Geranium pratense L.	Geraniaceae	Rattan joug, Gugchuk, Gadur	Leaves, Whole plant	diarrhoea, dysentery	Wagay, 2014; Ballabh and Chaurasia, 2009; Namtak and Sharma, 2018
Medicago sativa Linn.	Fabaceae***	Poshi gassi	Leaves	digestive tract problems	Wagay, 2014
Indigofera heterantha Linn.	Fabaceae***	Zand	Stems, Rhizome	abdominal pain.	Wagay, 2014; Yousuf *et al.*, 2012
Podophyllum hexandrum Royle.	Berberidaceae	Wanwangun , Bankakdi, Banwangun	Fruits	gastric problems, diarrhoea	Wagay, 2014; Kumar *et al.*, 2009, Mir and John, 2014
Prunus persica Linn.	Rosaceae	Cheneaum	Leaves	abdominal pains, indigestion	Wagay, 2014; Yousuf *et al.*, 2012; Lone and Bhardwaj, 2013
Foeniculum vulgare Mill.	Apiaceae*****	Badiyan	Seeds	stomach disorders	Wagay, 2014
Artemisia absinthium L.	Asteraceae*	Tethwan, Damer	Leaves, Infloresence	stomach pain	Wagay, 2014; Malik *et al.*, 2011
Mentha longifolia Host.	Lamiaceae**	Chala pudna, Pudhina, Jangali pudina, Jangali Pootna, Pholing	Aerial parts	indigestion, dysentery and darrhoea	Wagay, 2014, Rashid, 2012; Ballabh and Chaurasia, 2009; Bhatia *et al.*, 2014, Rao *et al.*, 2015; Namtak and Sharma, 2018
Bergenia ciliata Sternb.	Saxifragaceae	Batpeva, Zakhm e hayat	Rhizome, Roots	diarrhoea	Lone *et al.*, 2012; Rashid, 2012

To be continued..

Name of the plant species	Family	Local names	Plant parts used	Ailments treated	References
Morchella esculenta (L.) Pers.ex Fr.	Helveliaceae	Guchi	Fruiting body	stomach troubles	Lone *et al.*, 2012
Platanus orientalis L.	Platanaceae	Chinar, Booni, Boin, Bune	Wood, Bark	diarrhoea, dysentery	Lone *et al.*, 2012; Kumar *et al.* 2015
Acacia catechu (Linn.) Wild.	Mimosaceae	Khair	Stem	diarrhoea	Bhushan and Kumar, 2013
Acacia nilotica (Linn.) Del.	Fabaceae***	Kikar	Pods, Bark, Flowers, Gum, Leaves and Roots	diarrhoea, dysentery	Bhushan and Kumar, 2013
chyranthes aspera Linn.	Amaranthaceae	Parkanda	Leaves, Seeds	diarrhoea	Bhushan and Kumar, 2103
Aegle marmelos Corr.	Rutaceae	Bel, Bill	Leaves, Fruits and Roots	digestion problem	Bhushan and Kumar, 2013
Bombax ceiba Linn.	Bombacaceae	Simbal	Roots, Bark and Young fruits	diarrhoea, dysentery, stomach ache	Bhushan and Kumar, 2013; Singh and Bhellum, 2015; Rashid, 2012
Butea monosperma (Lamak.) Tubert.	Fabaceae***	Pala, Palash	Gum, Seeds and Roots bark	diarrhoea	Bhushan and Kumar, 2013
Cordia dichotoma G. Forst	Boraginaceae	Lusade	Fruits	cholera, dysentery	Bhushan and Kumar, 2013
Oroxylum indicum (Linn.) Vent.	Begnoniaceae	Tantu	Stem bark, Leaves and Fruits	stomachache	Bhushan and Kumar, 2013; Rao *et al.*, 2015
Terminalia bellirica Roxb.	Combretaceae	Bahera	Fruits	diarrhoea.	Bhushan and Kumar, 2013
Toona hexandra (Wall Ex. Roxb.)	Meliaceae	Tooni	Leaves	chronic dysentery	Bhushan and Kumar, 2013
Vitex negundo Linn.	Verbenaceae	Bana	Flowers, Leaves	diarrhoea	Bhushan and Kumar, 2013; Kumar and Bhagat, Rashid, 2012; Rao *et al.*, 2015
Abrus precatorius	Fabaceae***	Ratti, Rakat	Roots	colic pain	Kumar and Bhagat, 2012; Rashid, 2012
Arisaema jacquemontii Blume.	Araceae	Sappe di dhud, Sarp	Tubers	colic pain	Kumar and Bhagat, 2012
Bahuinia vahlii	Caesalpiniacea	Malungad	Buds, Roots	diarrhoea, dysentery	Kumar and Bhagat, 2012
Bauhinia variegate	Fabaceae***	Katraid	Bark, Roots	digestive problems	Kumar and Bhagat, 2012
Blumea lacera (Burm. F.) DC.	Asteraceae*	Blumea	Roots, Leaves	cholera	Kumar and Bhagat, 2012
Carrisa opaca Stapf.	Apocyanaceae	Garna	Leaves, Roots	stomach aliment	Kumar and Bhagat, 2012
Cassia fistula Linn.	Caesalpinaceae	Amaltas, Karangal	Leaves, Roots and Seeds	dysentery	Kumar and Bhagat, 2012
Cedrus deodara G. Don	Pinaceae	Deodar	Bark	dysentery, diarrhoea	Kumar and Bhagat, 2012; Rashid, 2012
Chenopodium album Linn.	Chenopodicaceae	Bathua, Janchikarpo	Leaves	dysentery, diarrhoea, peptic ulcers	Kumar and Bhagat, 2012; Rashid, 2012; Namtak and Sharma, 2018
Euphorbia hirta Linn.	Euphorbiaceae	Jar Dudli	Whole plant	dysentery	Kumar and Bhagat, 2012
Ficus benghalensis Linn.	Moraceae	Borh	Latex	dysentery, diarrhoea	Kumar and Bhagat, 2012
Fumaria indica Pugsky	Flacourtiaceae	Pit-pappada	Whole plant	digestive problems	Kumar and Bhagat, 2012
Hypericum performatum Linn.	Hypericaceae	Bankehdi, Basanti phool	Whole plant	diarrhoea, acute dysentery	Kumar and Bhagat, 2012; Rashid, 2012
Justicia adhatoda Linn.	Acantaceae	Barenkar	Leaves	dysentery, diarrhoea	Kumar and Bhagat, 2012
Malvestrum coromandelicum Garcke	Malvaceae	Baddi Beryaad	Whole plant	dysentery	Kumar and Bhagat, 2012
Nerium indicum Mill.	Apocynaceae	Suha Ganira, Lal Gandira, Gandeela	Whole plant	chronic stomach ache, dysentry	Kumar and Bhagat, 2012; Singh and Bhellum, 2015
Origanum vulgare Linn.	Lamiaceae**	Saathra	Whole plant	diarrhoea	Kumar and Bhagat, 2012
Polygonum barbatum Linn.	Polygonceae	Jal Nadi	Bark	colic problem	Kumar and Bhagat, 2012

To be continued..

Name of the plant species	Family	Local names	Plant parts used	Ailments treated	References
Punica granatum Linn.	Lythraceae	Dhaadma, Anaar, Daen, Dan	Root, Bark and Fruits	dysentery, diarrhoea	Kumar and Bhagat, 2012; Kumar *et al.*, 2015
Quercus leucotrichophora A. Camus.	Fagaceae	Banjh, Ree, Chidhaar, Rein	Leaves, Rasin	diarrhoea, stomach ache	Kumar and Bhagat, 2012 Kumari *et al.*, 2013; Rao *et al.*, 2015
Salvia plebiam R. Br.	Lamiaceae**	Samundar Sokh, Kakrondha	Seeds, Leaves	diarrhoea	Kumar and Bhagat, 2012;Kumari *et al.*,2013
Sida chordate Borssum	Malvaceae	Demehdi	Roots, Leaves	diarrhoea	Kumar and Bhagat, 2012
Solanum nigrum Linn.	Solanaceae	Kayan Kothi, Kambai, Tsigma, Kaayankothi, Peelkaan, Mako	Whole plant	dysentery, stomach problems	Kumar and Bhagat, 2012; Lone and Bhardwaj, 2013; Ballabh and Chaurasia, 2009 Rao *et al.*, 2015
Syzygium cumini Skeels.	Myrtaceae	Tallan, Jamnu	Bark, Seeds	diarrhoe	Kumar and Bhagat, 2012; Rashid, 2012
Taxus baccta Linn.	Taxaceae	Barmi	Leaves	indigestion, diarrhoe	Kumar and Bhagat, 2012
Verbascum Thapsus Linn.	Scrophulariaceae	Giddar Tambaku, Ban Tambaku, Shondok	Leaves	dysentery, stomach pains,	Kumar and Bhagat, 2012; Shah *et al.*, 2015; Rashid, 2012; Kumar *et al.* 2009, Namtak and Sharma, 2018
Zanthoxylum alatum Roxb.	Rutaceae	Timbru, Timro,Temer,	Whole plant	cholera, stomach ache,	Kumar and Bhagat, 2012; Rashid, 2012; Kumari *et al*., 2013
Alstonia scholaris	Apocynacece	Satpatra	NS	cholera	Singh and Bhellum, 2015
Bauhinia purpurea L.	Papilionaceae	NM	NS	indigestion	Singh and Bhellum, 2015
Carica papaya L.	Caricaceae	Papita	NS	gastric troubles	Singh and Bhellum, 2015
Chenopodium murale L.	Chenopodiaceae	Bathu	NS	diarrhoea, dysentry	Singh and Bhellum, 2015
Cordial myxa Willd.	Boraginaaceae	Lasura	NS	stomachache.	Singh and Bhellum, 2015
Dalbergia sissoo Rooxb.	Papilionaceae	Tahli	NS	dysentry	Singh and Bhellum, 2015
Ficus glomerata Roxb.	Moraceae	NM	NS	diarrhoea.	Singh and Bhellum, 2015
Murraya koenigii (L.) Spreng	Rutaceae	Kari patta	NS	diarrhoea , dysentry	Singh and Bhellum, 2015
Sonchus arvensis L.	Asteraceae*	NM	NS	cholera, dysentry	Singh and Bhellum, 2015
Ziziphus mauritiana Lamk.	Rhamnaceae	Ber	NS	stomachache	Singh and Bhellum, 2015
Dioscorea belophylla (Prain) Voigtex Haines	Dioscoraceae	arr	Tubers	abdominal pain	Shah *et al.*, 2015
Dioscorea bulbifera L.	Dioscoraceae	Kalo- gundo/ Jatlogundo	NS	dysentery	Shah *et al.*, 2015
Dioscorea deltoidea Wall.ex Griseb.	Dioscoraceae	Kalo-maru	Tubers	abdominal pain	Shah *et al.*, 2015
Duchesnea chrysantha (Zoll. & Moritzi) Miq	Rosaceae	Mavo	Leaves	indigestion	Shah *et al.*, 2015
Ipomoea nil (L.) Roth	Convolvulaceae	Khatpavo	NS	abdominal pain	Shah *et al.*, 2015
Hedychium coronarium J. König	Zingiberaceae	Jungli- Haldi	Rhizome	bdominal pain	Shah *et al.*, 2015
Solanum viarum Dunal	Solanaceae	Mokri	Fruits	dysentery	Shah *et al.*, 2015
Albizia lebbeck Benth	Fabaceae***	Dhrienk	Fruits	stomach infection	Rashid, 2012
Amaranthus gangeticus L.	Amaranthaceae	Bari Ghanar	Seeds	darrhoea and dysentery.	Rashid, 2012
Bauhinia vahlii Wight & Arnott.	Caesalpiniaceae	Kalari bhel	Bark	diarrhoea and intestinal cramps	Rashid, 2012
Melia azadirachta (L.) Adelb.	Meliaceae	Nemi, Kourh	Seeds	dysentery	Rashid, 2012

To be continued..

Name of the plant species	Family	Local names	Plant parts used	Ailments treated	References
Nymphia alba L.	Moraceae	NM	Rhizome	darrhoea	Rashid, 2012
Pistacia integerrima J.L. Stewart ex Brandis.	Anacardiaceae	Kangar	NS	dysentery	Rashid, 2012
Taxus wallichiana Zucc.	Taxaceae	Barmi	Leaves	indigestion	Rashid, 2012
Tinospora cordifolia (Thunb.) Miers.	Menispermaceae	Guloh	Stem, Leaves	stomach troubles	Rashid, 2012
Acorus calamus	Acoraceae	Vai	Roots, Rhizome	stomach troubles, chronic diarrhoea	Mir and John, 2014; Lone and Bhardwaj, 2013
Bergenia ligulata	Saxifragaceae	Pashanabheda	Roots	stomachache	Mir and John, 2014
Euphorbia helioscopia	Euphorbiaceae	Gursochal	Seeds	cholera	Mir and John, 2014
Mentha arvensis	Lamiaceae**	Pudina, Pudne	Leaves	abdominal pain, dysentery	Mir and John, 2014; Yousuf *et al.*, 2012; Lone and Bhardwaj, 2013; Malik *et al.*, 2011; Bhatia *et al.*, 2014; Rao *et al.*, 2015
Oxalis corniculata	Oxalidaceae	Amrul	Leaves	diarrhoea	Mir and John, 2014;Kumar *et al.*, 2015
Paeonia emodi	Papaveraceae	Kuklipot	Roots, Flowers	diarrhoea	Mir and John, 2014
Urtica dioica	Urticaceae	Soi	Whole plant	stomach pain,	Mir and John, 2014
Ajuga bracteosa Wall.	Lamiaceae**	Janiadam, Neel kanthi, Neel Kanth	Leaves	diarrhoea, gastric problems, dysentery	Yousuf *et al.*, 2012 Kumari *et al.*, 2103 Kumar *et al.*, 2009, Rao *et al.*, 2015
Achyranthes bidentata	Amaranthaceae	Purkandi	Leaves, Roots	abdominal pains	Kumari *et al.*, 2013
Colebrookea oppositifolia	Lamiaceae**	Swali	Leaves	stomach ache	Kumari *et al.*, 2013
Holarrhena antidysenterica	Apocynaceae	Inderjoe, Kogar	Seeds, Bark and Leaves	dysentery	Kumari *et al.*, 2013; Bhatia *et al.*, 2014
Indigofera gerardiana	Fabaceae***	Kathi	Roots	abdominal pain	Kumari *et al.*, 2013
Rabdosia rugosa	Lamiaceae**	Maldah	Leaves	stomach ache and gastric	Kumari *et al.*, 2013
Taraxacum officinale	Asteraceae*	Bathur, Sanma	Roots, Leaves	diarrhoea, dysentery	Kumari *et al.*, 2013; Ballabh and Chaurasia, 2009
Nasturtium officinale L.	Brassicaceae****	KulHak	NS	stomach ulcers	Malik *et al.*, 2011
Saussurea costus Lipstch	Asteraceae*	Kuth	Roots	dysentery	Malik *et al.*, 2011; Rao *et al.*, 2015
Artemisia maritima L.	Asteraceae*	Mooin	Leaves	stomach problems	Kumar *et al.*, 2009
Geranium wallichianum D. Don. ex Sweet. Family	Geraniaceae	Gul-e Sanobar, Rathenjoth, Kawashud	Roots	chronic diarrhoea, dysentery	Kumar *et al.*, 2009, Kumar *et al.*, 2015
Rheum australe D. Don.	Polygoniaceae	Chukri	Roots	stomach pains	Kumar *et al.*, 2009
Viburnum grandiflorum Wallich ex DC	Sambucaceae	Chalandar	Leaves	abdominal pain.	Kumar *et al.*, 2009
Azadirachta Indica	Miliaceae	Nim, Neem	Leaves	stomach ailments	Rao *et al.*, 2015
Cissampelos pareira	Menispermaceae	Battal bel	Leaves	diarrhoea.	Rao *et al.*, 2015;Bhatia *et al.*, 2014
Gentiana kuroo Royle	Gentianaceae	Neelkunthu	Roots	stomach-ache	Rao *et al.*, 2015
Mangifera indica L.	Anacardiaceae	Amb	Leaves	dysentery	Rao *et al.*, 2015
Plantago major L.	Plantaginaceae	Gobba, Bud Gulla, Loqout gulla	Seeds	diarrhoea and dysentery	Rao *et al.*, 2015; Lone and Bhardwaj, 2013; Kumar *et al.*, 2015
Polygonum hydropiper L.	Polygonaceae	Pipli, Chock Chine	Whole plant	diarrhoea	Rao *et al.*, 2015; Lone and Bhardwaj, 2013; Kumar *et al.*, 2015
Ranunculus arvensis	Ranunculaceae	Charmula, Gur-socha	Whole plant	diarrhoea	Rao *et al.*, 2015
Ailanthus altissima (Mill) Swingle	Simaroubaceae	Brath	Bark	diarrhoea	Kumar *et al.*, 2015

To be continued...

Name of the plant species	Family	Local names	Plant parts used	Ailments treated	References
Ajuga integrifolia Buch.-Ham	Lamiaceae**	Jan-i-Adam	Leaves	Ddysentery	Kumar *et al.*, 2015
Amaranthus hybridus L.	Amaranthaceae	Ganhar	Whole plant	dysentery	Kumar *et al.*, 2015
Conium maculatum L.	Apiaceae*****	Mohra kach	Fruits	stomach ache	Kumar *et al.*, 2015
Quercus robur L.	Fagaceae	Hum	Fruit, Seeds, Bark	diarrhoea	Kumar *et al.*, 2015
Rubia cordifolia L.	Rubiaceae	Manjithi, Mazait, Manjith	Roots, Leaves, Stem	dysentery, stomach-ache, indigestion	Kumar *et al.*, 2015, Ballabh and Chaurasia, 2009
Solanum americanum Mill.	Solanaceae	Kambai	Leaves, Fruits	dysentery	Kumar *et al.*, 2015
Geum urbanum L.	Rosaceae	Gogli mool	Roots	diarrhoea, dysentery	Kumar *et al.*, 2015
Malva sylvestris L.	Malvaceae	Gur sachal, Sotzhal	Whole plant, Leaves, Stem	diarrhoea	Kumar *et al.*, 2015
Nepeta cataria L.	Lamiaceae**	Gandh soi	Whole plant	dysentery	Kumar *et al.*, 2015
Mimosa pudica L.	Mimosaceae	Chuimui	Roots	dysentery, abdominal spasms	Bhatia *et al.*, 2014
Achillea millefolium L.	Asteraceae*	Gandana	Leaves	stomach-ache	Ballabh and Chaurasia, 2009
Allium prezwalskianum Regel.	Alliaceae	Jangali Lahsun, Skotse, Kangmar	Leaves, Shoots	dysentery	Ballabh and Chaurasia, 2009; Namtak and Sharma, 2018
Arbidopsis himalaica (Edgew) Schulz	Brassicaceae****	NM	Whole plant	indigestion	Ballabh and Chaurasia, 2009
Arabis glandulosa	Brassicaceae****	NM	Leaves	abdominal pain	Ballabh and Chaurasia, 2009
Artemisia brevifolia Wall. Ex DC.	Asteraceae*	Kirmala, Khampa	Leaves, Flowers	stomach problems	Ballabh and Chaurasia, 2009;Namtak and Sharma, 2018
Artemisia dracunculus L.	Asteraceae*	NM	Leaves, Flowers	indigestion	Ballabh and Chaurasia, 2009
Artemisia gmelinii Web ex. Stechm.	Asteraceae*	Khamchu	Leaves, Flowers	diarrhoea	Ballabh and Chaurasia, 2009
Clematis orienatails L. var. *acutifolia* Hk. f.et T.	Ranunculaceae	Tiktikma, rBisho, Emong	Twigs, Branches	indigestion	Ballabh and Chaurasia, 2009; Namtak and Sharma, 2018
Daucus carota L.	Apiaceae*****	Gajar	Roots	dysentery	Ballabh and Chaurasia, 2009
Epilobium angustifolium L.	Onagraceae	Utpalwenabo	Whole plant	abdominal pain	Ballabh and Chaurasia, 2009
Hypecoum leptocarpum Hk.f.et T	Papaveraceae	Parpata	Whole plant	stomach-ache	Ballabh and Chaurasia, 2009
Meconopsis aculeate Royle	Papaveraceae	Landrementok	Whole plant	stomach-ache	Ballabh and Chaurasia, 2009
Morina longifollia Wall	Dipsacaceae	Kim	Whole plant	indigestion	Ballabh and Chaurasia, 2009
Nepta coerulascens Maxim	Lamiaceae**	Khora	Whole plant	dysentery, stomach-ache	Ballabh and Chaurasia, 2009
Nepta glutinosa Beth	Lamiaceae**	Jatukpa	Flowers, Leaves	diarrhoea, dysentery, stomach-ache	Ballabh and Chaurasia, 2009
Ocimum basilicum L.	Lamiaceae**	Van Tulsi	Leaves	stomach-ache	Ballabh and Chaurasia, 2009
Pedicularis cheilanthifolia Schrenk	Scrophulariaceae	Kikimo	Whole plant	stomach-ache	Ballabh and Chaurasia, 2009
Peganum harmala L.	Zygophyllaceae	Sepan	Seeds	stomach-ache	Ballabh and Chaurasia, 2009
Picrorhiza kurrooa Royle ex Benth	Scrophulariaceae	Kutki, Koud	Roots, Rhizome	stomach-ache	Ballabh and Chaurasia, 2009;Lone and Bhardwaj, 2013
Plantago depressa Wild	Plantaginaceae	Tharam	Whole plant	stomach pain, diarrhoea, dysentery	Ballabh and Chaurasia, 2009
Prangos pabularia Lindl	Apiaceae*****	Palano	Roots	indigestion	Ballabh and Chaurasia, 2009
Ranunculus trichophyllus Chaix	Ranumculaceae	Rengo	Whole plant	diarrhoea	Ballabh and Chaurasia, 2009
Rapanus sativus L.	Brassicaceae****	Muli	Roots	chronic diarrhoea	Ballabh and Chaurasia, 2009
Rheum webbianum Royle	Polygonaceae	Lachhu	Roots, Leaves	indigestion	Ballabh and Chaurasia, 2009

To be continued...

Name of the plant species	Family	Local names	Plant parts used	Ailments treated	References
Saussurea jacea (Klotz.) Cl.	Asteraceae*	Shirut	Whole plant	stomach-ache	Ballabh and Chaurasia, 2009
Sedum ewersii Ledeb	Crassulaceae	Gomni	Shoots, Leaves	dysentery	Ballabh and Chaurasia, 2009
Senecio chrysanthemoides DC	Asteraceae*	Heching, Bagghu	Whole plant	dysentery	Ballabh and Chaurasia, 2009; Lone and Bhardwaj, 20013
Sisybrium Sophia L.	Brassicaceae****	NM	Seeds	stomach-ache	Ballabh and Chaurasia, 2009
Swertia thomsonii Cl. Ex Hk. f. & T	Gentianaceae	Tikta	Whole plant	stomach-ache	Ballabh and Chaurasia, 2009
Zea mays L.	Poaceae	Makka	Grains	stomach-ache	Ballabh and Chaurasia, 2009
Allium sativum Linn.	Liliaceae	Rhoon	Bulb, Cloves	stomach problems, diarrhoea	Lone and Bhardwaj, 2013
Cynodon dactylon (Linn.) Pers.	Poaceae	Dramun	Whole plant	dysentery	Lone and Bhardwaj, 2013
Dryopteris barbigera (Moore) Kuntze	Pteridaceae	Dade, Kunji	Leaves, Rhizome	dysentery	Lone and Bhardwaj, 2013
Plantago lanceolata Linn.	Plantaginaceae	Kashur Gulla, Chamchipeti	Whole plant	dysentery	Lone and Bhardwaj, 2013
Raphanus sativus Linn.	Brassicaceae****	Mujh	Roots	indigestion	Lone and Bhardwaj, 2013
Trigonella foenum-graecum Linn.	Fabaceae***	Meth	Seeds	stomach problems	Lone and Bhardwaj, 2013
Aconitum violaceum Jacquem ex Stapf.	Ranunculaceae	Mohand	Roots, Flowers	stomach problems	Lone and Bhardwaj, 2013
Artmisia absinthium Linn.	Asteraceae*	Tithwan	Leaves, Inflorescence	abdominal pain	Lone and Bhardwaj, 2013
Valeriana jatamansi Jones	Valerianceae	Mushkibala	Roots	abdominal pain, diarrhoea	Lone and Bhardwaj, 2013
Allium humile Kunth	Amaryllidaceae	Kyu	Leaves, Bulb	stomach complaints, indigestion	Namtak and Sharma, 2018
Allium sativum L	Amaryllidaceae	sGogpa	Leaves, Bulb	indigestion	Namtak and Sharma, 2018
Biebersteinia odora Stephan ex Fisch	Geraniaceae	Drakspos, Sari	Whole plants, Roots	diarrhoea	Namtak and Sharma, 2018
Bistorta vivipara (L.) Gray	Polygonaceae	Langna	Flowers, Stem	abdominal pain	Namtak and Sharma, 2018
Capparis spinosa L	Capparaceae	Kabra	Leaves, Stem	stomach problem	Namtak and Sharma, 2018
Carum carvi L.	Apiaceae	Kosnyot	Roots	gastric troubles, indigestion, stomache	Namtak and Sharma, 2018
Chenopodium botrys L	Chenopodiaceae	Snue	Leaves	stomach complaints	Namtak and Sharma, 2018
Clematis tibetana Kuntze	Ranunculaceae	Zakgic	Whole Plant	indigestion	Namtak and Sharma, 2018
Heracleum pinnatum C.B. Clarke	Apiaceae	Spru	Roots	abdominal cramps	Namtak and Sharma, 2018
Oxyria digyna (L.) Hill	Polygonaceae	Changskur, Chu-lchum, Lamanchu	Leaves	indigestion	Namtak and Sharma, 2018
Plantago himalaica Pilg.	Plantaginaceae	Tharum, Humbuksuk	Seeds	diarrhoea, gastric disorder	Namtak and Sharma, 2018
Potentilla anserina L	Rosaceae	Troma	Rhizome, Leaves	diarrhoea, stomach complaints	Namtak and Sharma, 2018
Urtica hyperborea Jacq. ex Wedd.	Urticaceae	Zatsod	Leaves, Whole Plant	stomachache	Namtak and Sharma, 2018

*having 20 species; **16 species; *** 12 species; ****11 species; *****9 species; NS not specified; NM not mentioned

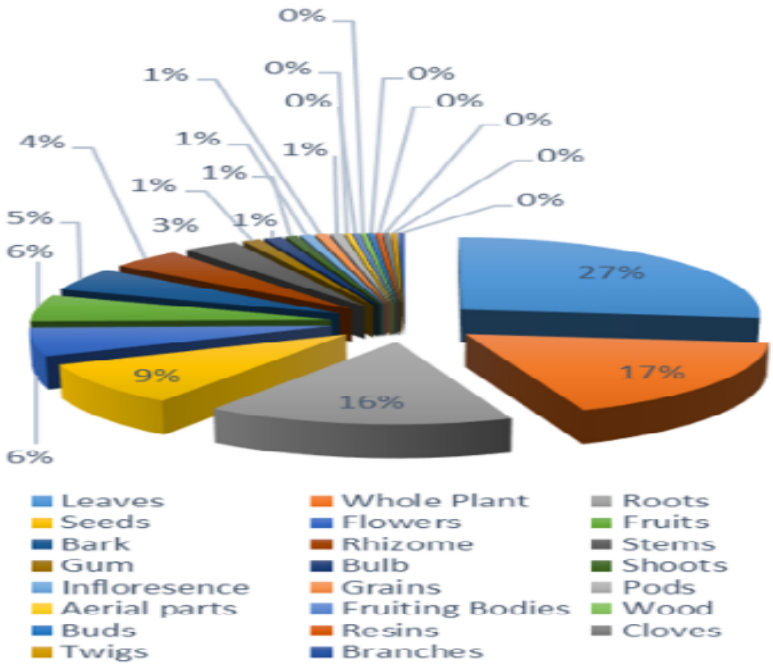

Fig. 1. Percentage of the various plant parts used as a medication.

Besides this, Jammu and Kashmir State Medicinal Plants Board (SMPB) established in January 2001, is attempting to organize, screen and give bearings as per the projects and strategies of National Medicinal Plants Board (NMPB), Department of Indian System of Medicine (AYUSH) Government of India identified for proper utilization of medicinal plants in Jammu and Kashmir State (Bhatt, 2016). Moreover, the Forest department of Jammu and Kashmir has also taken the initiative in terms of In-situ and Ex-situ conservation of medicinal plants (TeriSAS, 2018).

1. *In-situ* Conservation: The on-site conservation monitoring and management of endangered plant species or existing plant species in their natural habitat refer to in-situ conservation.

(i) Gene bank, National parks, sacred sites and grooves are the methods used for in-situ conservation of plants

(ii) The only method used for conserving the plant diversity to genetic, ecosystem and species level for long-term. As it is necessary to preserve distinct representative of that biogeographic zones having intra- and inter-specific variation.

2. *Ex-situ* Conservation: Aims to increase the number of nurseries, seedling suppliers, plantations and establish medicinal plant gardens.

(i) Plantation over private lands via seedling distribution: In accordance with the Social Forestry Project, the farmers have started planting trees. Still, efforts are being made to promote the plantation of ethnomedicinal plants in farmlands. For this, training on plantation and extraction procedures are required to be illustrated to farmers.

(ii) Herbal Gardens: In the different climatic zone of state various herbal gardens are on the verge of the establishment like Kangan in Ganderbal district (Temperate zone), Rajouri and Manyal in Rajouri district (Sub-tropical zone) and Choglamsar in Leh district (Cold desert zone). Besides, Department of Education, J&K Government has launched a new project "Herbal Gardens" (funded by MHRD) under which every educational institute shall establish a botanical garden. The main objectives are:

3. Creating Awareness about cultivation technology and conserve the ethnomedicinal plants.

4. Establish the gene pool of exotic and indigenous species for conservation, propagation and research purpose.

5. Endorse the benefits of medicinal plants and their cultivation among the local public.

6. Establish various medicinal plants repository for long-term endurance.

7. Establish a herbal garden for attracting tourist and promoting the Indian system of medicine.

8. Distribute herbal plant seedling and its propagating material among the farmers.

(i) **Seed Banks:** At this place, germplasms are cryopreserved for conservation purpose. The can be special arboretum where plants will be grown repeatedly for collecting and preserving seedling till their viability lasts. Currently, these facilities are at their experimental stage with SK University of Agricultural Science and Technology 'Jammu', and SK University of Agricultural Science and Technology 'Kashmir'.

(ii) **Stakeholders:** Promote and support the individuals that are the true user of medicinal plant and its derivatives, traders, conventional vaids those who practise Ayurvedic/Unani method for treating patients, and Tribal, belonging to Bakerwals, Gaddies and Gujjars community, Forest department and Research organizations/Universities/NGOs to conserve these medicinal plants.

CONCLUSION

Even though the Jammu and Kashmir state has blossomed with different therapeutic plants, however, the proper knowledge is limited to local residents and nomadic only. Presently modern generations are not well-versed with knowledge of indigenous plant collections. In spite of the presence of ethnomedicinal plant species, people of J&K suffering from acute diarrhoeal and gastroenteritis complications. Therefore, Various Government and Non-Government Organisations (NGOs) have introduced different preventive measure and policies for the conservation of ethnomedicinal plants species. Now, there is need of collaboration of research communities and government agencies to create awareness among local people and attract pharmaceutical industries to use the medicinal plants for therapeutic purpose at a commercial level.

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