Review Article

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REVIEW ON THE PLANTS REPORTED IN THE ETHNOBOTANICAL PRACTICES FOR DIARRHEAL DISEASE IN UTTAR PRADESH, INDIA

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ABSTRACT

No need to say that diarrhoeal disease is one of the major health concerns of the entire world. Many treatment modalities are put forth and tried to achieve the best control over the morbidity and mortality caused by the diarrhoeal disease. The resistance to the anti-microbial drugs, development of carrier state, misuse of antimicrobial drugs by the common people and change in the course of the disease after the use of antimicrobial drugs are really the worrisome issues in treating diarrhoeal disease. On the top of it, the prevalence of diarrhoea in children is so much high and severe that addressing it with a proper therapy, in some cases and in some occasions becomes very difficult. Initial approach with effective herbs, sometimes, makes wonders. Tribal people staying away from the urban areas, have their own plant remedies for treating different diarrhoeas. Uttar Pradesh is one among such states of India that possesses enormous knowledge of traditional practices such as ethno-medicine and folklore practices. Their utility needs to be brought under the ambit of the main streams of health practices. For the reason, some of them, may turn in to the remarkable source of drugs or lead compounds or the drug candidates. This study is based mainly on the data published in the articles related to ethnobotany, folklore practice and local utilization of medicinal plants by the people of different zones of Uttar Pradesh. This review reveals 117 medicinal plants belonging to 53 different botanical families utilized in the ethnobotanical practices for treating diarrhoeal disease in Uttar Pradesh.

Keywords: Ethnobotany, Diarrhoeal disease, Uttar Pradesh, Grahi, Astringent

INTRODUCTION

According to Hershberger, the term Ethnobotany refers to the usage of plants by aboriginals and it encompasses the relationship between the humans and plants at different levels[1]

Ethnobotanical practice is an art of healing learnt and practised by the ethnic groups. The practice of ethnomedicine is not a new system of health care. It started from the time when people looked for the medical assistance through the plants and other substances that they trust as medicine. The selection of a botanical for treating a condition is purely depends on their belief system, cultural interest and the advice of their ancestors. In many occasions, the rationale behind selecting a particular plant is not at all known to them. Never the less, they are pretty sure about its therapeutic effect.

According to Pushpa gandhan, In India, 68 million people belonging to 227 ethnic groups and comprising of 573 tribal communities derived from 6 racial stocks exist in different parts of the country[2] Most of these communities' dwell in and around the forest areas. They procure their medicine from the plants grown nearby and the tribal population in India constitutes 8.2% of total population[3]. Interestingly, as per the mental health global action program 2002 of WH0, over 80% of the population particularly in developing countries depends on the plants for their primary healthcare system[4] Diarrhoeal disease is one of the biggest threats to the health and considered as eighth leading cause of death among all the ages[5]. Every year around 525000 children die due to diarrhoea[6]. In spite of many treatment modalities by different system of healthcare in India, it is a little difficult to get relieved from the burden of mortality and morbidity of diarrhoeal disease. Among the different states of India, Uttar Pradesh is one of most affected states. The disease burden profile of Uttar Pradesh from 1990-2016 reveals Diarrhoea/URI/others contributed 40.1%, 12.5%, 10.5% and 24.5% in the age group of 0-14, 15-39, 40-69 and ≥70 years respectively. Diarrhoeal diseases accounts for 6% DALYs in top 15 cases during 2016[7]. Uttar Pradesh is one of the populous states of India with an area 240928 km^2 comparable in size with United Kingdom. It has been divided in to 18 administrative divisions and 75 districts. According to the census 2011, the total population is 119812341[8]. It is also a home for many tribal communities such as Ghond, Tharu, Agaria, Baiga, Bhotia, Chero, Raji, Pahari etc. Among them, Ghond constitutes the major tribe followed by Kharwar and Tharu[9]. Each of them has their own health care system. Interestingly, some of the plants they use to treat a particular condition coincides with Ayurveda therapeutics, while others have nothing to do. The term Diarrhoeal disease includes diarrhoea of different aetiology. The major risk in diarrhoeal disease is dehydration of varied severity. Hence, initial management with effective drugs is paramount importance. It does not matter whether the drug comes from a tribal practice/ folklore practice. Thus, this review is an earnest attempt to explore the medicinal plants for treating diarrhoeal disease by different people of Uttar Pradesh, as reported in 32 articles selected randomly.

Table 1: Plants and their Botanicals used by people of Uttar Pradesh for the treatment of Diarrhoeal disease

Botanical name	Family	Botanical	Reference
Acacia nilotica (L.) Delile	Leguminosae	Gum, Bark, Leaves, Seeds	10,12,14,15,19,21,32
Mimosa pudica L	Leguminosae	Whole plant, Root, Leaves	10,12,40
Mangifera indica L	Anacardiaceae	Bark, Fruit, Leaf, Seed	11,19,20,37
Morus alba L	Moraceae	Fruit, Leaf, Root	11,15,23
Punica granatum L	Lytheraceae	Fruit, Leaf	11,33,40
Abutilon indicum (L.) Sweet	Malvaceae	Root, Seeds	12
Acacia catechu (L. f) Willd	Leguminosae	Bark, Heart wood	12, 31
Haldina cordifolia (Roxb) Ridsale	Rubiaceae	Bark	12
Aegle marmelos (L.) Corrêa	Rutaceae	Fruit, Leaves	12,14,19,26,27,32,33,35,38,40
Agave Americana L	Asparagaceae	Leaf, Root	12,19
Albizia lebbeck (L.) Benth	Leguminosae	Seeds, Bark, Flower, Leaves	12,19
Alstonia scholaris (L) R. Br	Apocynaceae	Bark	12 ,32,38
Andrographis paniculata (Burm. f) Nees	Acanthaceae	Whole plant	12,31,34,35
Breonia chinensis (Lam) Cap uron	Rubiaceae	Bark	12
Boswellia serrata Roxb. ex. Colebr	Burseraceae	Bark, Resin, Leaves	12
Buchanania cochinchinensis (Lour) M.R Almeida	Anacardiaceae	Bark, Seeds	12,34
Cordia myxa L	Boraginaceae	Leaves	12
Euphorbia hypericifolia L	Euphorbiaceae	Leaves	12
Ficus racemosa L	Moraceae	Latex, Fruit, Bark	12,31,35,38
Helicteres isora L	Malvaceae	Fruit, Root, Bark	12,22,31
Holarrhena pubescens Wall. ex G. Don	Apocynaceae	Bark, Seeds	12,34,35
Leucas cephalotes (Roth) Spreng	Lamiaceae	Leaves, Flower, Whole plant	12
Limonia acidissima Groff	Rutaceae	Fruit, Bark	12,14,18,32
Manihot esculenta Crantz	Euphorbiaceae	Leaves	12
Nelumbo nucifera Gaertn	Nelumbonaeceae	Seeds, Flower, Rhizome, Leaves	12,13,34,40
Plumbago zeylanica L	Plumbaginaceae	Root	12
Pueraria tuberosa (Willd) DC	Leguminosae	Tuber	12
Shorea robusta Gaertn	Dipterocarpaceae	Resin	12,22
Urena lobata L	Malvaceae	Root, Leaves	12,40
Asparagus racemosus Willd	Asparagaceae	Tuber	13
Croton bonplandianum Baill	Euphorbiaceae	Leaves	14
Mentha arvensis L	Lamiaceae	Leaves	14
Solanum americanum Mill	Solanaceae	Whole plant, Fruit	14,19,28,32,33
Mucuna pruriens (L) DC	Leguminosae	Seeds, Pod hair	15,32
Acorus calamus L	Acoraceae	Rhizome	16
Barringtonia acutangula (L.) Gaertn	Lecythidaceae	Bark	17
Mallotus philippensis (Lam) Mull. Arg	Euphorbiaceae	Fruit	17
Abrus precatorius L	Leguminosae	Seeds	18,35
Phyllodium pulchellum (L.) Desv	Leguminosae	Root	18
Eichhornia crassipes (Mart.) Solms	Pontederiaceae	Leaves	18
Ailanthus excelsa Roxb	Simaroubaceae	Bark, Leaves, Gum	19,38
Argemone mexicana L	Papaveraceae	Root, Latex	19
Bambusa bambos (L.) Voss	Poaceae	Whole plant	19
Butea monosperma (Lam.) Taub	Leguminosae	Whole plant, Gum	19,21,31,32
Calotropis procera (Aiton) Dryand	Apocynaceae	Root, Latex, Root bark	19,32
Cannabis sativa L	Cannabinaceae	Fruit, Flower, Leaves	19,24
Carica papaya L	Caricaceae	Fruit, Seeds	19
Citrus medica L	Rutaceae	Fruit, Seeds	19
Phyllanthus emblica L	Phyllanthaceae	Fruit, Seeds, Bark	19,27,29,36
Euphorbia hirta L	Euphorbiaceae	Whole plant	19
Ficus benghalensis L	Moraceae	Bark, Fruit (Seeds) Latex	19,35,38
Ficus religiosa L	Moraceae	Fruit (Seeds), Latex, Bark	19,38
Gossypium herbaceum L	Malvaceae	Seeds	19
Jatropha curcas L	Euphorbiaceae	Fruit, Seeds, Leaves	19,25
Musa paradisiaca L	Musaceae	Whole plant, Fruit	19,33,38
Oxalis corniculata L	Oxalidaceae	Whole plant	19,40
Phoenix sylvestris (L) Roxb	Arecaceae	Fruit	19
Pterocarpus marsupium Roxb	Leguminosae	Seeds	19
Zingiber officinale Roscoe	Zingiberaceae	Rhizome	19
Ziziphus jujuba Mill	Rhamnaceae	Fruit	19,31
Ziziphus nummularia (Burm. f) Wight & Arn	Rhamnaceae	Root	10
Annona squamosa L	Annonaceae	Bark, Fruit	20,40
Lycopersicon esculentum Mill	Solanaceae	Fruit	20
Chlorophytum tuberosum (Roxb)	Asparagaceae	Tuber	22
Dyospyros chloroxylon Roxb	Ebenaceae	Stem bark, Leaf	22
Lawsonia inermis L	Lytheraceae	Leaves	22
Tinospora sinensis (Lour.) Merr.	Menispermaceae	Fruit	22
Writghtia tinctoria R. Br	Apocynaceae	Bark	22
Syzygium cumini (L.) Skeels	Myrtaceae	Seeds, Leaves, Ripe fruit	20,22,38

Terminalia arjuna (Roxb.) ex. DC. Wight & Arn	Combretaceae	Bark	20
Brassica rapa L	Brassicaceae	Seeds	24
Desmodium gangeticum (L.) DC	Leguminosae	Root	25
Morus nigra L	Moraceae	Fruit	26
Cynodon dactylon (L.) Pers	Poaceae	Whole plant	27,38
Celosia argentea L	Amarantaceae	Flower, Seeds	28,40
Fumaria parviflora Lam	Papaveraceae	Shoots	28
Bauhinia variegata L	Leguminosae	Bark, Twigs	29,31
Stephania japonica (Thunb) Meirs	Menispermaceae	Root	30
Marsilea minuta L	Marsileaceae	Whole plant	31
Nymphaea nouchali Burm f	Nymphaceae	Rhizome	31
Corchorus capsularis L	Malvaceae	Roots, Fruits	31
Murraya paniculata (L.) Jack	Rutaceae	Leaves	31
Desmodium triflorum (L.) Pers	Leguminosae	Whole plant	31
Tephrosia purpurea (L.) Pers	Leguminosae	Root, Leaves	31,37
Bauhinia racemosa Lam	Leguminosae	Leaves	31
Bauhinia vahlii Wight & Arn	Leguminosae	Bark	31
Combretum album Pers	Combretaceae	Leaves	31
Terminalia bellerica (Gaertn) Roxb	Combretaceae	Bark, Fruit	31
Ludwigia octovalvis (Jacq.) P.H	Onagraceae	Whole plant	31
Scoparia dulcis L	Plantaginaceae	Leaves	31
Oroxylum indicum (L) Kurz	Bignoniaceae	Stem bark, Leaves	22,31,35
Curculigo orchioides Gaertn	Hypoxidaceae	Whole plant	31
Phyla nodiflora (L)Greene	Verbenaceae	Leaf	32
Cyclea peltata (Lam.) Hook. f & Thomson	Menispermaceae	Root	32
Papaver somniferum L	Papaveraceae	Unripe fruit	32
Lepidium sativum L	Brassicaceae	Seeds	32
Caesalpinia bonduc (L.) Roxb	Leguminosae	Seeds	35
Euphorbia neriifolia L.	Euphorbiaceae	Leaves	35
Ficus lacor Buch-Ham	Moraceae	Bark	35
Litsea glutinosa (Lour.) C.B. Rob	Lauraceae	Bark	35
Salix salviifolia Brot	Salicaceae	Bark	35
Tamilnadia uliginosa (Retz)	Rubiaceae	Fruit	35
Rauvolfia serpentina (L) Bentj. ex. Kurz	Apocynaceae	Root	36,38
Coriandrum sativum L	Apiaceae	Leaves, Fruit	37,38
Artocarpus integer (Thunb.) Merr	Moraceae	Fruit	38
Centella asiatica (L.) Urb	Apiaceae	Whole plant, Leaves	22,38
Datura metel L	Solanaceae	Leaves	38
Euphorbia prostrata Aiton	Euphorbiaceae	Whole plant	38
Mentha longifolia (L.) L	Lamiaceae	Leaves	38
Momordica charantia L	Cucurbitaceae	Leaves	38
Psidium guajava L	Myrtaceae	Fruit	38
Saccharum officinarum L	Poaceae	Stem	38
Sisymbrium irio L	Brassicaceae	Seeds	38
Cyanthillium cinereum (L.) H. Rob	Compositae	Root	38
Boerhavia diffusa L	Nyctaginaceae	Root	39
Quercus oblongata D. Don	Fagaceae	Bark	41
Thymus serpyllum L	Lamiaceae	Whole plant	41

Table 2: Anti-diarrhoeal drugs in Ayurveda vis-a-vis ethnobotanical drugs for diarrhoeal disease used in Uttar Pradesh

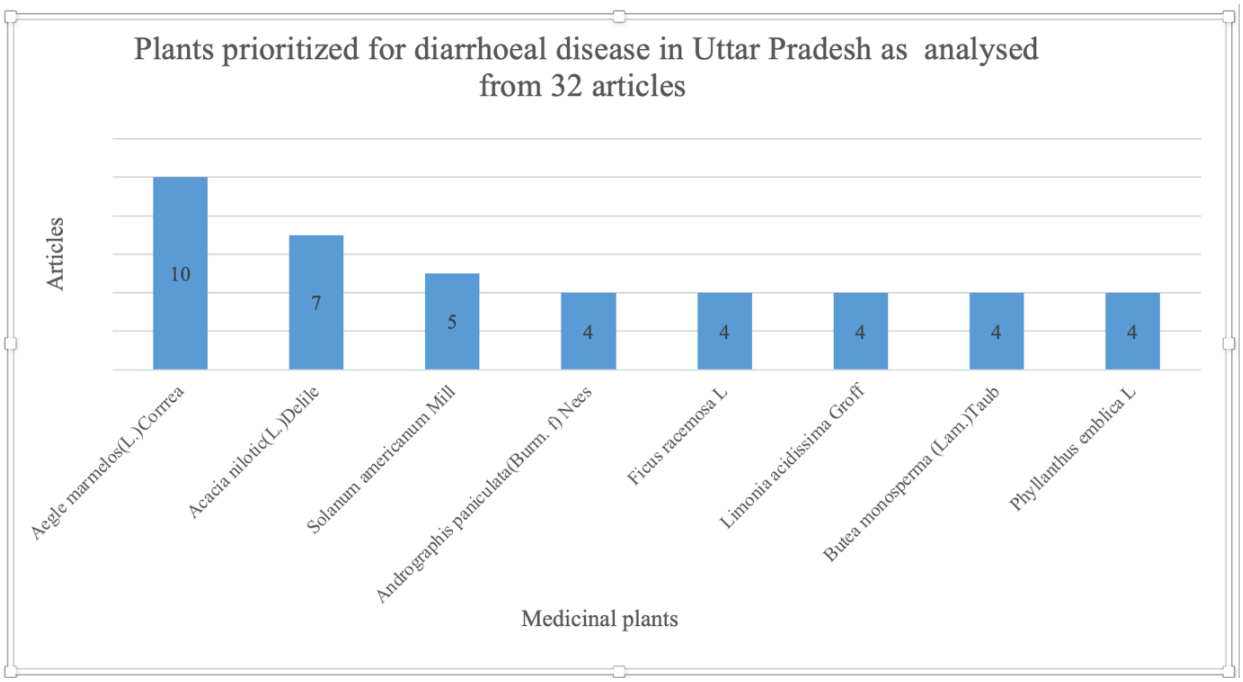
Botanical name	Names in Ayurveda	Reference
Acacia nilotica (L.) Delile	Babul	42
Mimosa pudica L	Lajjalu	45
Mangifera indica L	Amra	46
Punica granatum L	Dadima	42
Abutilon indicum (L.) Sweet	Atibala	42
Acacia catechu (L. f) Willd	Khadira	43
Aegle marmelos (L.) Corrêa	Bilva	47
Breonia chinensis (Lam) Capuron	Kadamba	50
Boswellia serrata Roxb. ex. Colebr	Shallaki	47
Buchanania cochinchinensis (Lour) M.R Almeida	Priyala	50
Ficus racemosa L	Udumbara	43,47
Helicteres isora L	Avartani	49
Holarrhena pubescens Wall. ex G. Don	Kutaja	42
Nelumbo nucifera Gaertn	Kamal	47
Plumbago zeylanica L	Chitraka	47
Shorea robusta Roth	Shala	45,47
Asparagus racemosus Willd	Shatavari	50
Mucuna pruriens (L) DC	Kapikacchu	54
Acorus calamus L	Vacha	45
Barringtonia acutangula (L.) Gaertn	Hijjal	43

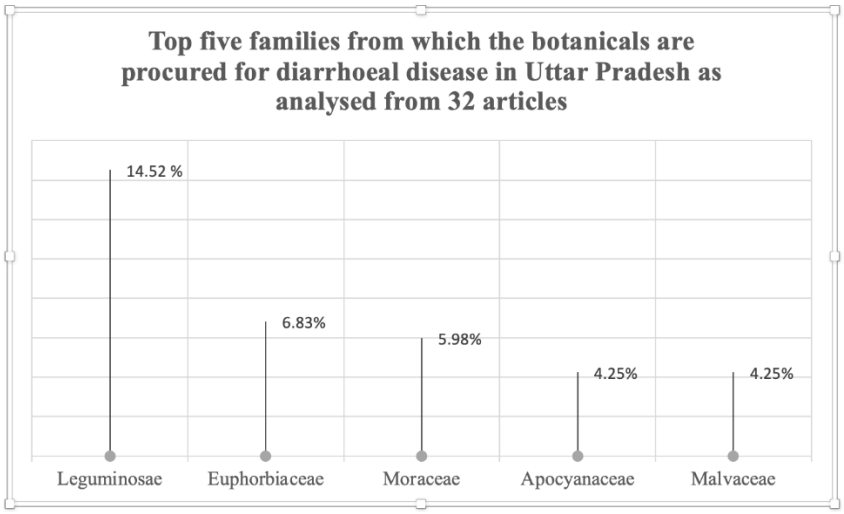
Ailanthus excelsa Roxb	Aralu	53
Butea monosperma (Lam.) Taub	Palasha	42
Calotropis procera (Aiton) Dryand	Ark	52
Cannabis sativa L	Bhang	42
Citrus medica L	Bijapurak	54
Phyllanthus emblica	Amalaki	54
Ficus benghalensis L	Vata	46
Ficus religiosa L	Ashwatha	43
Gossypium herbaceum L	Karpas	43
Musa paradisiaca L	Kadali	44
Oxalis corniculata L	Changeri	51
Phoenix sylvestris (L) Roxb	Kharjura	42
Pterocarpus marsupium Roxb	Beejak	43
Zingiber officinale Roscoe	Shunthi	52
Syzygium cumini (L.) Skeels	Jambu	51
Terminalia arjuna (Rox. b.) ex. DC. Wight & Arn	Arjuna	43
Desmodium gangeticum (L.) DC	Shalaparni	42
Cynodon dactylon (L.) Pers	Durva	43
Fumaria parviflora Lam	Parpatak	42
Bauhinia variegata L	Kanchanar	43
Marsilea minuta L	Sunnishanak	51
Nymphaea nouchali Burm f	Kumuda	43
Terminalia bellerica (Gaertn) Roxb	Bibhitak	49
Oroxylum indicum (L) Kurz	Shyonak	46
Papaver somniferum L	Ahiphena	42
Lepidium sativum L	Chandrashura	42
Caesalpinia bonduc (L.) Roxb	Kantaki karanj	43
Ficus lacor Buch-Ham	Plaksha	43
Litsea glutinosa (Lour.) C.B. Rob	Medasak	43
Coriandrum sativum L	Dhanyak	42
Artocarpus integer (Thunb.) Merr	Panasa	43
Boerhavia diffusa L	Punarnava	48
Diospyros chloroxylon Roxb	Tinduka	50
Lawsonia inermis L	Madayantika	50

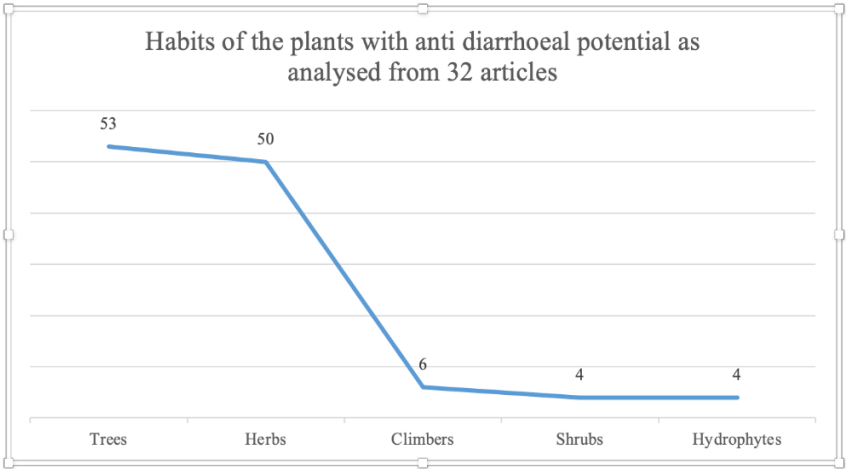
Table 3: Plants showing anti- diarrhoeal activity in different experimental models/studies

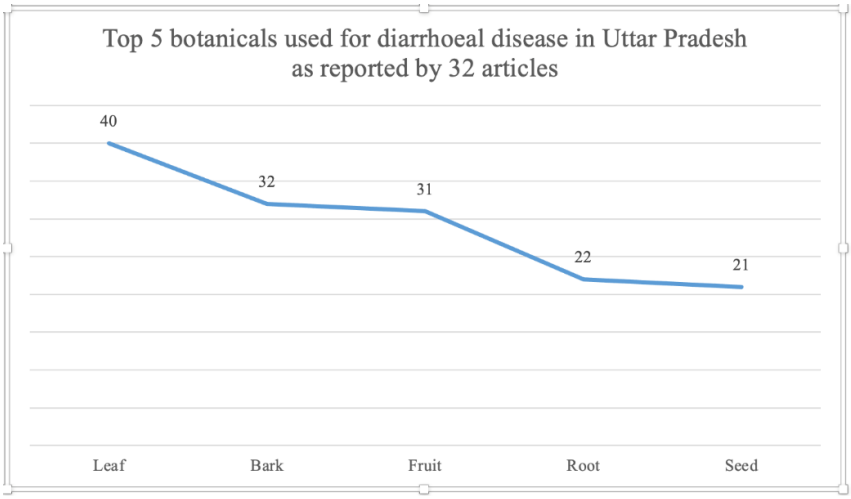
Medicinal Plants	Anti-diarrhoeal activity	Ref
Acacia nilotica (L.) Delile	Leaf extract (Methanol)	55
Mimosa pudica L	Leaf extract (Ethanol)	56
Mangifera indica L	Seed extract (Methanol & Aqueous)	57
Punica granatum L	Peel extract (Aqueous)	58
Abutilon indicum (L.) Sweet	Leaf extract (Methanol & Aqueous)	59
Acacia catechu (L. f) Willd	Bark extract (Methanol)	60
Haldina cordifolia (Roxb) Ridsale	Root bark extract (Benzene and Ethyl acetate)	61
Aegle marmelos (L.) Corrêa	Unripe fruit (crude aqueous extract)	62
Andrographis paniculata (Burm. f) Nees	Alcoholic extract	63
Breonia chinensis (Lam) Capuron	Hydro ethanolic extract	64
Boswellia serrata Roxb. ex. Colebr	Gum resin extract	65
Buchanania cochinchinensis (Lour) M.R Almeida	Alcoholic extract	66
Ficus racemosa L	Latex	67
Helicteres isora L	Fruit extract (Alcohol and Aqueous)	68
Holarrhena pubescens Wall. ex G. Don	Seed Extract (Ethanolic)	69
Leucas cephalotes (Roth) Spreng	Leaf extract (Ethanolic)	70
Limonia acidissima Groff	Stem bark extract (Alcoholic & Aqueous)	71
Manihot esculenta Crantz	Leaf extract (Ethanolic)	72
Nelumbo nucifera Gaertn	Rhizome extract (Methanolic)	73
Plumbago zeylanica L	Root extract	74
Urena lobata L	Leaf extract (Methanol)	75
Asparagus racemosus Willd	Root extract (Ethanol & Aqueous)	76
Solanum americanum Mill	Extract (Ethanol)	77
Acorus calamus L	Leaf extract (Methanol)	78,79
Barringtonia acutangula (L.) Gaertn	Seed &Leaf extract (Methanol)	80
Phyllodium pulchellum (L.) Desv	Leaf extract (Methanol)	81
Ailanthus excelsa Roxb	Stem bark extract (Methanol & Ethanol)	82,83
Butea monosperma (Lam.) Taub	Stem bark extract (Ethanol)	84
Calotropis procera (Aiton) Dryand	Dry latex, Leaf extract (Methanol)	85,121
Carica papaya L	Fruit extract	86
Phyllanthus emblica L	Fruit extract (Methanol)	87
Euphorbia hirta L	Lyophilized decoction	88
Ficus benghalensis L	Bark extract (Ethanol)	89
Pterocarpus marsupium Roxb	Heartwood extract (Ethanolic)	94

Zingiber officinale Roscoe	Rhizome decoction	95
Ziziphus jujuba Mill	Fruit extract (Ethanol)	96
Syzygium cumini (L.) Skeels	Seed extract (Aqueous), Leaves (Hydro alcoholic)	97,98
Terminalia arjuna (Roxb.) ex. DC. Wight & Arn	Bark extract (Aqueous)	99
Morus alba L	Crude extract	100
Cynodon dactylon (L.) Pers	Whole plant extract (Methanol)	101
Celosia argentea L	Leaf extract (alcoholic)	102
Fumaria parviflora Lam	Aqueous –Methanol extract	103
Stephania japonica (Thunb) Meirs	Whole plant extract (Ethanol)	104
Marsilea quadrifolia L	Aerial part extract (Methanol)	105
Murraya paniculata (L.) Jack	Leaf extract (Ethanol)	106
Bauhinia vahlii Wight & Arn	Leaves & stem extract (Ethanol)	107
Terminalia bellerica (Gaertn) Roxb	Fruit Pulp extract (Aqueous & Ethanolic)	108
Scoparia dulcis L	Leaf extract (Ethanolic)	109
Oroxylum indicum (L) Kurz	Crude extract and different fraction	110
Phyla nodiflora (L) Greene	Leaf extract (Aqueous)	111
Lepidium sativum L	Crude extract	112
Caesalpinia bonduc (L.) Roxb	Ethyl acetate fraction of leaves	113
Rauvolfia serpentina (L)Bentj. ex. Kurz	Leaf extract (Methanol)	114
Coriandrum sativum L	Leaf extract (Aqueous)	115
Centella asiatica (L.) Urb	Ethanol extract	116
Datura metel L	Seed extract (Methanol)	117
Mentha longifolia (L.) L	Essential oil from aerial parts	118
Momordica charantia L	Leaf extract (Aqueous)	119
Psidium guajava L	Extract (Aqueous)	120
Wrightia tinctoria R. Br	Ethanol extract	122









DISCUSSION

In this review, medicinal plants used for diarrhoeal disease by different people belonging to different zones of Uttar Pradesh as reported by the authors of different articles were analysed, in this regard, the most commonly used plant for diarrhoeal disease in different zones of Uttar Pradesh, is Bilva (*Aegle marmelos* (L.) Corrêa) which is mentioned in 10 articles followed by Babul (*Acacia nilotica* (L.) Delile) in 7 articles, Kakamachi (*Solanum americanum* Mill) in 5 articles. Kamala (*Nelumbo nucifera* Geartn), Amra (*Mangifera indica* L), Kalamegha (*Andrographis paniculata* (Burm. f.) Nees), Udumbara (*Ficus racemosa* L), Kapitha (*Limonia acidissima* Groff), Palasha (*Butea monosperma* (Lam.) Taub) and Amalaki (*Phyllanthus emblica* L) find place in 4 articles each. It indicates that these plants are preferred mainly in the treatment of diarrhoeal disease by people of different zones of Uttar Pradesh (Table 1).

Family

The authors of these 32 selected articles reported 117 plants belonging to 53 families for the treatment of different forms of diarrhoeal disease in Uttar Pradesh, of which, Legum inosae constitutes the main family (17 plants) (14.52%) used in the

treatment of diarrhoea followed by Euphorbiaceae (8 plants) (6.83%) Moraceae (7 plants) (5.98%) and Apocynaceae (5 plants) as well as Malvaceae (with 5 plants each) (4.27%) (Table 1).

Habit

Among the 117 plants reported in 32 articles for the treatment of diarrhoeal disease in Uttar Pradesh, 53 (45.29%) trees, 50 (42.73%) herbs, 04 (3.41%) shrubs, 06 (5.12%) climbers and 04 (3.14%) hydrophytes find the place in the ethnobotanical practice (Table 1).

Useful part

The local people of Uttar Pradesh, as reported in 32 selected articles, use leaves of 40 plants, bark of 32 plants, fruits of 31 plants, root of 22 plants and seeds of 21 plants (excluding 17 plants which are used as a whole) as the top 5 botanicals for the treatment of diarrhoea (Table 1).

Views from Ayurveda

Among 117 plants, used by the tribal, ethnic and local people of different zones of Uttar Pradesh, many of them are the source of the drugs explained in the treatises like Charaka Samhita, Sushruta Samhita and the lexicons like Raja Nighantu, Bhava Prakasha Nighantu, Nighantu Adarsha etc. Surprisingly, Useful parts of the few plants used to treat diarrhoea are same in ethnobotanical practice and Ayurveda. While, some plants don't find place in the Ayurveda therapeutics as a popular remedy for diarrhoea. Ayurveda used the terms "Stambhana/Grahi/Sangrahi/ Atisarajit/Atisaranashini/Atisaraharini/Atisarah/Atisaraghni/Grahini/Atisara Samharana and Sangrahika" to denote anti-diarrhoeal potentials in the plants. Among the 117 plants, 54 (46.15%) plants have been used in treatment of diarrhoeal diseases with or without the addition of other drugs in Ayurveda therapeutics. Some of them act as Sheetagrahi mainly targeting frequency of loose stools and some other act as Ushnagrahi targeting agni and ama, depending upon the rasa and veerya they possess. While, few others act on the vitiated dosha and bring back to the normalcy. Sheetagrahi drugs act as astringents and anti-secretory anti-diarrhoeal drugs. While, Ushnagrahi drugs act as anti-motility, anti-spasmodic and anti-inflammatory drugs. The drugs acting directly on vitiated dosha might be effective in diarrhoea of infective pathology (Table 2).

Views from Plant Research

Among 117 plants reported as the remedy for different forms of diarrhoeal disease for the different communities of Uttar Pradesh by the authors of 32 articles, 60 (51.28%) of them proved to be effective in diarrhoea by the different research protocols. Though the parts of plants, in some cases, are different from parts of plants used in ethnobotanical practice, yet, those studies give an idea that those plants possess anti-diarrhoeal activity in them. Many plants showed encouraging results in castor oil induced diarrhoea and PGE induced diarrhoea models. Among the various Phytochemicals tannins, diterpenes and flavonoids are found to be responsible for anti-diarrhoeal activity (Table 3)

CONCLUSION

This study reveals that ethno-botanical /tribal/local practices in different zones of Uttar Pradesh for the treatment diarrhoeal disease, as reported by 32 articles, includes 117 medicinal plants, of which 54 plants find place in Ayurveda therapeutics as a medication for diarrhoeal disease and 60 plants have proved their efficacy in diarrhoea in different research models. It is evident from this point that ethnobotanical practice is a detached, undocumented, unnoticed system of healthcare practice with lot of medical information. The present study opines that the leaves of 40 plant species are employed for the treatment of diarrhoeal disease (excluding the leaves of those plant species which are used as a whole). On analysing the habits of the plants, it is clear that 53 trees are the source of medicine and Leguminosae is highly appreciated as a family that constitutes major group of medicinal plants used for diarrhoea in Uttar Pradesh. Nevertheless, 10 articles reported the utility of Bilva (*Aegle marmelos* (L.) Corrêa) as the remedy for diarrhoea. This study directs the researchers to explore scientifically the anti-diarrhoeal potentials in other plants that are not included in Ayurveda therapeutics and not proved their efficacy by research models, but put in ethnobotanical practice in Uttar Pradesh

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