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REVIEW ARTICLE

Ethnopharmacology of Boraginaceae Family- An Update

S. Sivakrishnan*, M. Swamivelmanickam

Department of Pharmacy, FEAT, Annamalai University, Annamalai Nagar, Chidambaram-608002, Tamil nadu, India.

Abstract

Ethnopharmacology studies natural medicines derived from plants and other substance that have been traditionally used by group of people to treat various human diseases. In this world, there is a dynamic relationship between plants and humans. Traditionally the plants used to cure diseases are termed as medicinal plants. Boraginaceae, the borage- or forget-me-not family, includes a variety of shrubs, trees, and herbs, totaling about 2,400 species in 146 genera found worldwide. It is effective against a variety of diseases like hepatic, cardiovascular, cancer, urolithiasis, bladder, respiratory, leprosy, syphilis, gonorrhea, aphthous ulcers, rheumatism, spleen and lung. This review reveals the traditional medicinal values of the Boraginaceae family and it will be helpful to explore the knowledge about Boraginaceae species for the researchers.

Keywords: *Boraginaceae, Ethnopharmacology, Researchers, Diseases, Forget-me-not.*

Introduction

The Boraginaceae have a cosmopolitan distribution. Many found in temperate and subtropical regions including the Mediterranean and the western portion of North America. The plants are generally herbaceous. These plants have alternately arranged leaves, or a combination of alternate and opposite leaves. The leaf blades usually have a narrow shape; many are linear or lance-shaped. They are smooth-edged or toothed, and some have petioles. Most species have bisexual flowers, but some taxa are dioecious. Most pollination is by hymenopterans, such as bees.

Most species have inflorescences that have a coiling shape, at least when new. The flower has a usually five-lobed calyx. The corolla varies in shape from rotate to bell-shaped to tubular, but it generally has five lobes. It can be green, white, yellow, orange, pink, purple, or blue. There are five stamens and one style with one or two stigmas. The fruit is a drupe, sometimes fleshy [1].

Most members of this family have hairy leaves. In some species, anthocyanins cause the flowers to change color from red to blue with age. This may be a signal to pollinators that a flower is old and depleted of pollen and nectar [2].

Economic Importance of Boraginaceae includes as Fruits of *Cordia dichotoma* are used in pickles and jams and those of *Ehretia serrata* are edible, *Alkanna tinctoria* and Cordia are medicinal. *Trichodesma indicum* is diuretic. Symphytum is known to stimulate joining of fractured bones and Mertensia, Myosotis, Cordia, Cynoglossum are cultivated for ornamentals, timber, red dye from the roots of *Alkanna*, and contraceptive used by some Native Americans.

Traditional Medicinal Activities of Boraginaceae Family

Alkanet (*Alkanna tinctoria*)

Alkanna is an astringent and a source of red pigment used in cosmetics. It was traditionally used topically for the treatment of skin wounds and diseases. Orally, alkanna root has been used for diarrhea and gastric ulcers. Alkanna root has demonstrated radical scavenging activity, suggesting potential antiaging effects and Anti-proliferative activity against human cancer cell lines has been reported [3].

Crude extracts of *Alkanna tinctoria*, demonstrate antimicrobial activity in screening [4,5]. Alkannin has been shown to exert activity against gram-positive bacteria,

gram-negative bacteria, and fungi. Additionally, alkannin may exert bactericidal action on *Pseudomonas aeruginosa*, a bacterium that forms biofilms against wound healing.

Borago Officinalis

Borago officinalis is an annual herb in the flowering plant of the Boraginaceae family (the borage or forget-me-not family). It is also known as starflower. It is native to the Mediterranean region and has naturalized in many other locales. It grows satisfactorily in gardens in the United Kingdom climate, remaining in the garden from year to year byself seeding. Borage is a fairly common domestic herbal remedy that has been used since ancient times. It has a particularly good reputation for its beneficial effect on the mind, being used to dispel melancholy and induce euphoria.

It is a soothing saline, diuretic herb that soothes damaged or irritated tissues. The leaves, and to a lesser extent the flowers, are demulcent, diaphoretic, depurative, mildly diuretic, emollient, expectorant, febrifuge, lenitive and mildly sedative. An infusion is taken internally in the treatment of a range of ailments including fevers, chest problems and kidney problems, though it should not be prescribed to people with liver problems. Externally it is used as a poultice for inflammatory swellings.

The seeds are a rich source of gamma-linolenic acid; this oil helps to regulate the hormonal systems and lowers blood pressure. It is used both internally and externally for used to treat various diseases such as, helping to relieve skin complaints and pre-menstrual tension. Traditionally, Borago officinalis has been used to treat hyperactive gastrointestinal disorders, respiratory diseases, cardiovascular disorder [6] and bladder diseases, etc [7]. A methanolic extract of borage has shown strong amoebicidal activity [8].

Comfrey (Symphytum spp.)

Symphytum is a genus of flowering plants in the borage family, Boraginaceae. There are up to 35 species [9], known by the common name Comfrey. Some species and hybrids, particularly *Symphytum officinale* and *Symphytum uplandicum* are used in gardening and herbal medicine. Comfrey is most commonly used topically [10-12].

It is native to Europe, growing in damp, grassy places. It is locally frequent throughout Ireland and Britian on river banks and ditches. It occurs elsewhere, including North America, as an introduced species and sometimes a weed. Comfrey is used as a tea for upset stomach, ulcers, heavy menstrual periods, diarrhea, bloody urine, persistent cough, painful breathing (pleuritis), bronchitis, cancer, and chest pain (angina).

Comfrey is applied to the skin for ulcers, wounds, joint inflammation, bruises, rheumatoid arthritis, swollen veins (phlebitis), gout, fractures, reduces tenderness and swelling of sprains. It is also used as a gargle for gum disease and sore throat. Comfrey should not be used during pregnancy and lactation, in infants, and in people with liver, kidney, or vascular diseases [13].

Cordia Sebestena

Cordia sebestena is a species of flowering plant in the borage family, Boraginaceae that is native to the American tropics. Essential oils have been reported to possess various medicinal properties in folkloric medical practices. Their application in modern medicine has also increased recently. Syrup of the bark, flowers, or fruit is taken for coughs and bronchial ailments. Teas made from the flowers are used to treat venereal disease. The tree's sap is applied to wounds.

Leaves washed in warm water or dressed with oil are used as poultices for headaches and sprains. Unripe fruit are emetic. Reports indicated that the plant is used for the treatment of gastrointestinal disorder such as indigestion. Bioactive compounds such as sebestinoids have been isolated from the ethyl acetate extract of the fruit [14].

A recent study indicated that C. sebestena leaf extract showed hypoglycemic and hypolipidemic activities in high-fat-diet-fed streptozotocin-induced diabetic rats [15]. In our previous studies, we had reported the free radical scavenging activity and antioxidant potential of the stem bark and flowers of *Cordia sebestena*, respectively [16,17].

Heliotropium Indicum

Heliotropium indicum Linn.is commonly known as Indian heliotrope is an annual,

hirsute plant belongs to family Boraginaceae. It is native to Asia and widely used in native medicine in Tamilnadu, India. The name "heliotrope" originates from the old idea that the inflorescence of these plants turned their rows of flowers to the sun. The meaning of 'helios' in Greek is 'sun' and 'tropein' from where the word 'tropium' is derived means 'to turn'. *Heliotropium indicum* has been used in different traditional and folklore systems of medicine for curing various diseases.

Heliotropium indicum has been used in different traditional and folklore systems of medicine for curing various diseases. *Heliotropium indicum* to cure skin diseases, poison bites, stomach ache and nervous disorders [18]. In some African countries, another ethno-pharmacological survey reports that *Heliotropium indicum* is believed to be useful in treating malaria, abdominal pain and dermatitis. The highest number of usages (22%) was reported for the treatment of malaria [19].

In Jamaica, the decoction of the entire plant is taken orally for treatment of intractable fever, ulcers, venereal diseases and sore throat and used externally in vaginal cavity to induce abortion in pregnant females and administered rectally to treat local sores in the rectum [20], while in Philippines and Senegal, used orally as diuretic and for the treatment of kidney stone [21, 22].

The infusion of the flower is taken orally by females for the treatment of menorrhagia in Jamaica. In Rodrigues, the decoction of the entire plant is used externally for treating herpes and the paste of fresh plant is used externally for cleansing and dressing of wounds and ulcers. The sap of the stem is used orally by females for treating dysmenorrhea [23].

The hot water extract of the flower is taken orally by the females as an emmenagouge in small dose and abortive in large dose while a paste of fresh entire plant is used externally for treatment of head lice in the West Indies [24]. In Thailand, the dried inflorescence is believed to produce permanent sterilization when taken orally in females. One gram of the dried and powdered inflorescence mixed with milk or water is used for three days beginning with the fourth day of menses to achieve the desired result [25]. Other folk remedies include use of decoction of the leaves for treatment of fever [26], insect bites, stings, diarrhoea, skin rashes, menstrual disorder and urticaria. The decoction of the leaves is also credited to be useful in curing insect stings (macerated with sugar cane juice), scorpion stings and as abortive in large dose and emmenagouge in small dose [27]. The leaf paste is applied externally to cure rheumatism in Rayal Seema in Andhra Pradesh, India [28] and skin infection in Nicaragua [29].

The decoction of both leaf and root together is also used for treating whooping cough in children in Eastern Nicaragua [30]. In Amazon, the paste of both leaf and root together is applied externally in scorpion stings, bug bites [31] while the paste is recommended for treating sores and warts in Taiwan [32]. In Malaysia, a paste made from the plant is applied to counteract putrefaction, to treat pyoderma and ringworm infection. In Burma, a decoction of the whole plant is used to treat gonorrhea while in Indonesia; an infusion of the leaves is used to soothe mouth sprue. A decoction of the dried roots is drunk in the Philippines to promote menses, while the seeds are used to treat cholera, malaria, and for wound-healing.

Cynoglossum officinale

Cynoglossum officinale is a herbaceous plant of the family Boraginaceae. It is found in most parts of Europe, and also North America, where it was accidentally introduced. Hound's tongue has a long history of use as a medicinal herb, though it is rarely used in modern herbalism [33, 34]. The leaves contain allantoin, a highly effective agent that speeds up the healing process in the body and the plant is potentially carcinogenic [35] (though it has also been used in the treatment of cancer [36]).

The leaves and roots are analgesic, anti-haemorrhoidal, antispasmodic, astringent, digestive, emollient and slightly narcotic [37-41]. The plant contains the alkaloids cynoglossine and consolidin, which are used medicinally to relieve pain. They depress the central nervous system and are also potentially carcinogenic. The plant has been used internally in the treatment of coughs and diarrhoea, though it is now mainly used externally as a poultice on piles, wounds, minor injuries, bites and ulcers.

The plant has a wide antitumour reputation for cancers of various types. A homeopathic remedy is made from the roots. It is very effective in the treatment of insomnia.

Pulmonaria Officinalis

Pulmonaria officinalis L (lungwort), belonging to the Boraginaceae family, is an herbaceous perennial plant, widely spread in Europe and western Asia. It has a long tradition of use in folk medicine of many countries as a remedy against various respiratory diseases including asthma, chronic bronchitis, tuberculosis, laryngitis, and coughs. It also has expectorant, antitussive, and diaphoretic properties [42-47].

Other ethnomedicinal sources indicate that infusions or decoctions of *Pulmonaria officinalis* are administrated as astringent, anticoagulant, anti-microbial, and anti-inflammatory herbs, as well as a remedy for urinary disorders, cystitis, moreover, it shows diuretic and anti-lithiasis activities [48, 49].

Applied externally, it can be very beneficial in the treatment of burns, wounds, cuts, and eczema. *Pulmonaria officinalis* extract was tested as a component of bioactive hydrogels, which can be used in the treatment of wounds with heavy and medium exudates [50]. Aerial parts of *Pulmonaria officinalis*, commercially available as Pulmonariae Herba, in combination with *Tussilago farfara* (coltsfoot), are often used to treat chronic cough, including whooping cough. Pulmonariae Herba is also an ingredient of various herbal mixtures or dietary supplements. Astringent, emollient, and skin conditioning properties allow for the use of *Pulmonaria officinalis* extract in cosmetology [51].

Echium Plantagineum

Echium plantagineum (Family: Boraginaceae) is commonly known as Purple viper's bugloss [52]. *Echium plantagineum* is native to western and southern europe, northern Africa and southwestern asia [53]. Medicinally it is used as a remedy for bites of serpents and stings of scorpions. Other herbal medicine applications include treatments for colds, coughs, fever, headache, water retention, kidney stones, inflammation, skin boils, and melancholia, and applications for pain relief and the promotion of wound healing [54].

Echium Vulgare

Echium vulgare known as viper's bugloss and blueweed [55, 56] is a species of flowering plant in the borage family Boraginaceae. It is native to most of Europe, western and central Asia [57, 58] and it occurs as an introduced species in north-eastern North America [59]. Viper's bugloss was once considered to be a preventative and remedy for viper bites. It is related to borage, Borago officinalis, and has many similar actions, especially in its sweat-inducing and diuretic effects.

In recent times, however, it has fallen out of use, partly due to lack of interest in its medicinal potential and partly to its content of pyrrolizidine alkaloids which are toxic in isolation. The leaves and flowering stems are antitussive, aphrodisiac, demulcent, diaphoretic, diuretic, pectoral and vulnerary. An infusion of the plant is taken internally as a diuretic and in the treatment of fevers, headaches, chest conditions etc.

The juice of the plant is an effective emollient for reddened and delicate skins; it is used as a poultice or plaster to treat boils and carbuncles. The leaves are harvested in the summer and can be dried for later use. The roots contain the healing agent allantoin. The plant is said to be efficacious in the treatment of snake bites. When chopped up finely, the fresh flowering heads can be made into a poultice for treating whitlows and boils.

Myosotis Arvensis

Myosotis arvensis or is a herbaceous annual to short lived perennial flowering plant in the family Boraginaceae. It is widely distributed in Eurasia and New Zealand and naturalized in United States, apart from south and south-west. Myosotis Arvensis medicinal uses are: anti-inflammatory, analgesics, Asthma, Eczema, Expectorant, Kidney problems, Liver problems, tuberculosis and Wounds [60, 61].

Aqueous tincture of *Myosotis arvensis* exerts anxiolytic and antidepressant activity. It also inhibited the development of micro-organisms such as *shigella sonnei* and *candida albicans*. Additionally, extracts of *Myosotis arvensis* reduced viability of *staphylococcus aureus* and *staphylococcus faecalis*.

Cordia Africana

Cordia africana is a species of flowering tree in the borage family (Boraginaceae) that is native to Africa. Nutritionally *Cordia africana* was found to be a good source of total phenols. It is also a good partial source for nutritionally important vitamin A and Iron, as well as for protein, vitamin C, calcium, copper, potassium, magnesium, manganese, and phosphorus. The traditional medicinal value assessment showed that the fruit is used to treat gastrointestinal symptoms, and the anthelmintic and constipation treatment.

Traditional medicine: some literature notes that there is traditional medicinal use of the plant [62-65]. More specifically migraine, broken bones, wounds, gastritis and constipation were noted to be treated with bark, leaf and fruit[66]. In more detailed studies illnesses and plant-parts used and how they are used are described. The fresh, juicy bark is used to tie a broken bone; this splint is changed occasionally with a fresh one until the bone is healed [67-71].

In Congo the bark is macerated and used to treat madness via nasal application [72]. A decoction made from the bark is used to treat venereal diseases and that of the root to treat bilharzias. In another study sterile branches are ingested to treat problems of urination at night [73]. The wood and root are used as a vermifuges and the ash as skin and mucosae treatment. In Tanzania around lake Victoria region the root is used to treat tuberculosis, cough and asthma [74].

The leaves and root are used to treat liver diseases, the root is used to treat amoebiasis, and the root and root bark are used to treat stomach ache and diarrhea [75]. For general body ailment inhalation of the boiled leaf vapours is used [76]. The leaves are used ashed and mixed with butter to treat burns and wounds [77].

The cursed leaf juice is drunk to treat general body ailment, diarrhoea, and tonsillitis and is rubbed into the eye to treat eye infections the crushed leaf is also applied to wounds for healing [78]. Old wounds are cured using crushed leaves in Tanzania, and intestinal worms are expelled by eating leaves by Masai and Chagga people in East and South Africa.

Cordia Alliodora

Cordia alliodora is a species of flowering tree in the borage family, Boraginaceae that is native to the American tropics. The leaves are stimulant, stomachic and used in the treatment of catarrh. Decoction prepared from leaves is being used traditionally as tonic to treat pulmonary disorders. Paste of leaves is used topically in bruises and swellings. An ointment prepared from the seeds is applied on the skin to treat skin diseases in the Caribbean Islands. Powdered seeds are used in cutaneous diseases [79-81].

Cordia Americana

Cordia americana (L.) is a tree belonging Boraginaceae family, commonly found in South American tropical rainforests including South of Brazil, North of Argentina, and South of Paraguay. Decoction of leaves is used to wash wounds and to treat various inflammations and as a wound healer. The poultice of the leaves is used topically on wounds. Plant is used for the treatment of ulcers, diarrhoea, liver diseases, as an emollient and antibiotic against syphilis [82, 85].

Cordia Boissieri

Cordia boissieri is a species of flowering shrub or small tree in the borage family, Boraginaceae. Its native range extends from southern Texas in the United States south to central Mexico. The tree is mainly harvested from the wild for its use in traditional medicine [86]. It is cultivated in Cuba as a medicinal plant and is often planted for ornament, being very handsome when covered with flowers [87].

Decoction prepared from leaves is used to treat bronchial asthma and rheumatism. Fruit jelly is used in cough and cold [88, 89]. A decoction of the leaves is a popular domestic remedy for rheumatism and is generally employed in the treatment of bronchial affections [90] and the wood attracted some attention in Germany as a possible remedy for tuberculosis.

Cordia Chacoensis

Cordia chacoensis (Boraginaceae) is found in South America, Mexico, California and West Indies. Leaves used in anaemia and stomach ache, menstrual cramps, respiratory disorders [91, 92].

Cordia Curassavica

Cordia curassavica, commonly known as black sage or wild sage, is a species of flowering plant in the borage family, Boraginaceae. It is sometimes called tropical black sage to distinguish it from another unrelated species named black sage, *Salvia mellifera*. It is native to tropical America but has also been widely introduced to Southeast Asia and the tropical Pacific region, where it is an invasive weed. Leaves are used for the treatment of cough, cold, headache, inflammation and menstrual pain [93].

The leaves and young stems are anodyne, aromatic, astringent, hypotensive, pectoral, stimulant, stomachic, sudorific and vulnerary. An infusion is used to treat a range of digestive disorders including biliousness, grippe and diarrhoea, as well as fevers, rheumatism, gonorrhoea, colds and chest complaints. The juice of finely crushed leaves is used for alleviating monthly stomach pains (menstrual cramps) [94].

The macerated leaves are used externally as a dandruff treatment, or are placed in a bath as a treatment for fever. The leaves contain several medically active compounds including artemetin, which has been documented with significant anti-inflammatory actions. The plant also contains naphthoquinones which have demonstrated antifungal activities against *Cladosporium cucumerinum*, *Candida albicans* and toxic properties against larvae of the yellow fever-transmitting mosquito [95].

Other studies have confirmed that the plant has anti-ulcer and gastro-protective actions at very low dosages; that is has a pain relieving effect; and that is has antibacterial activity against Gram-positive and Gram-negative bacteria, including 14 bacterial strains causing the most common gastrointestinal diseases. The stem is chewed to clean the teeth and destroy bad breath.

Cordia Cylindrostachya

Cordia cylindrostachya is found in South America, Mexico, Curacao and Aruba. A leaf is used to relieve stomach pain, dysentery, diarrhoea, menstrual pain and has abortifacient effect [96, 97].

Cordia Dentate

Cordia dentata, commonly known as white manjack, is a species of flowering plant in the borage family, Boraginaceae. It is native to the southern United States, México, Central America, Colombia and Venezuela. In the Caribbean, it is found in Jamaica, Cuba, Virgin Islands and Puerto Rico. It is also found in Madagascar. The flowers show emollient, pectoral, sudorific and diaphoretic properties. Decoction of flower is used to induce perspiration. The flowers and leaves are used in chest problems. Leaves and flowers are reported to have emollient properties and to be used for treat affections of the chest. Wood charcoal is used in stomach problems [98, 99].

Cordia Dichotoma

Cordia dichotoma is a species of flowering tree in the borage family, Boraginaceae. It grows in the warmer parts of India, Sri Lanka, Malaysia, South China, Java, New Guinea, Philippines Islands, and tropical Australia. Bark, fruit and leaves of the plant are used in fever, diarrhoea, burning sensation, leprosy, ulcer, bronchitis and arthralgia. Leaves are also used as contraceptive [100,101]. *Cordia dichotoma* is commonly used in Ayurveda, and Unani system of medicine for treating cold, cough, coryza, fever, and skin diseases. Fruits of the tree are edible, slimy, and heavy to digest. They are given in colic pain, disorders of blood, seminal weakness, and sexual disorders.

Bark of the tree helps in Ama dosha. Ama is the unmetabolised waste that is not utilized by the body. It is sticky, heavy, viscous, slimy, unctuous, wet, cold, sweet, and is the root cause of most of diseases in the body, resulting from excess Vayu or Kapha (or both). The bark and the unripe fruit are used as a mild tonic. The juice of the bark along with coconut milk relieves severe colic. The bark is given for dysentery together with Pomegranate rind. The bark is useful in calculous affections, strangury, and catarrh.

The decoction of the bark is found useful in dyspepsia, and fevers. Externally the moistened bark is applied on boils, and tumors. In powder form, it is used as a cure for ulcers in the mouth. The bark is rubbed on teeth to strengthen them. The infusion of bark is used as a gargle. Powdered bark is applied on itchy skin patches on hands, and legs. The ripe fruits are sweet, cooling, and demulcent.

The mucilage in the fruit is used for treating coughs, and diseases of the chest, uterus, urethra, etc. In larger doses, it is given for bilious ailments as a laxative. The kernels of the fruit are a good remedy in ringworm. They are powdered, mixed with oil, and applied on ringworm. The leaves are useful as an application to ulcers, and in headache. The decoction of leaves is used in cough, and cold.

Cordia Fragrantissima

Cordia fragrantissima is widely distributed in Myanmar. The bark is used to treat fever, diarrhoea and skin diseases and as an anthelmintic. Fruit is used as diuretic, expectorant, anthelmintic and to treat lung and spleen diseases [102].

Cordia Gilletii

Cordia gilletii De Wild (Boraginaceae) root bark is traditionally used in Democratic Republic of Congo (DRC). Decoction of the root bark is used to treat malaria and diarrhoea. Bark is used topically to treat wounds and skin disorder [103].

Cordia Globosa

Cordia globosa (Jacq.) Kunth is a shrub popularly known in Northeastern Brazil as 'maria-preta'. The decoction or infusion of the leaves of *Cordia globosa* is used in folk medicine for the treatment of the symptoms of rheumatism, painful menstruation and dyspepsia. In Jamaica, the tea of leaves is used by women against painful menstruation [104]. The leaves and the stems have spasmolytic activity on guinea pig ileum as well as on rabbit duodenum, and also was confirmed the vasodilator activity on isolated rats' hindquarter [105].

Cordia Goetzei

Cordia goetzei Gürke is the accepted name of a species in the genus Cordia (family Boraginaceae). Small tree up to 8(10) m. high and its native range is South Somalia to South Tropical Africa Somalia, Kenya and Tanzania. The Decoction prepared from leaf and roots are used to treat leprosy and malaria [106,107].

Cordia Latifolia

Cordia latifolia, commonly known as lasora, belongs to the plant family Boraginaceae. It is widely distributed in India and Pakistan. The plant parts are reputed for many medicinal properties, such as diuretic and laxative, and as a cure in diseases of lungs and spleen, coughs, helminthiasis, leprosy, and skin diseases [108-110]. The ripe fruits are known to contain large amounts of vitamins [111].

The fruit is astringent, cooling, demulcent, diuretic, expectorant and pectoral. It is also highly mucilaginous and the mucilage is useful in diseases of the lungs and also useful in the diseases of the spleen. Fruits are used in treatment of cough, chest diseases and uterus and urethral diseases, and as laxative in bilious affection, Kernel is used in ringworm. Bark infusion is used as gargle [112, 113].

Cordia Leucocephala

It is a shrubby plant in the borage family (Boraginaceae), endemic to the Galápagos Islands. It is found in North-eastern Brazil. Leaves and roots are used in digestive disorders, dyspepsia, in menstrual colic and rheumatism [114, 115].

Cordia Linnaei

It is widely distributed in Northern and Southern America. Leaf decoction is used to treat liver ailments and fever [116].

Cordia Macleodii

Cordia macleodii is widely distributed in India, specifically in Chota Nagpur, Kanara and Konkan. For the treatment of wounds, fresh paste prepared from the leaves is applied on forehead in high fever. Stem bark is used in jaundice.

Cordia Monoica

It is widely distributed in Africa and Asia. Leaves are used in eye diseases. Leaves and stem bark is used in the treatment of leprosy in the form of steam bath. Leaves are also used in chest pain. Decoction of the powdered bark is used in the form of bath .Roots are used to treat vomiting and malaria [117, 119].

Cordia Myxa

Cordia myxa is a species of flowering plant in the borage family, Boraginaceae. It is a medium-sized broad-leaved deciduous tree. It is found growing primarily in Asia, as well as, across the globe especially in tropical regions having the right type of geophysical

environment. In the Indian subcontinent, it is seen coming up naturally and growing abundantly from Myanmar in the east to Afghanistan in the west. Leaves macerate is used to treat trypanosomiasis.

Topically, the leaves are applied as a lotion to tsetse fly bites Powdered bark is applied to skin in case of broken bones before a plaster is applied to improve healing [120,121].The half ripe lasura fruit makes a tasty broth which is hot in effect as per Ayurveda practitioners. The fruit makes an excellent pickle too which is not as hot. In fact the preserve is quite affective against indigestion. The ripe fruit are full of vitamins and regular use is supposed to be helpful in good growth of hair. Lasura preparations are, thus, good for people whose constitution might have tendency to go baldy. In addition to fruit, lasura bark and roots are also very effective as a local remedy against cough, cold and various other ailments connected with indigestion and throat problems. In pre-modern medicine, diasebesten is a soft, purgative electuary, containing sebesten, the plum-like fruit of the tree *Cordia myxa*, as one of its ingredients.

Cordia platythyrsa

Cordia platythyrsa is a species of flowering plant in the borage family, Boraginaceae, found in Africa and is native to Cameroon, Congo, Ivory Coast, Equatorial Guinea, Gabon, the Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Nigeria, Senegal, Sierra Leone, Togo, and the Democratic Republic of the Congo. The plant is used as depurative.

Cordia Spinescens

It is found in North America and South America including Mexico, Panama, Venezuela and Peru. The entire plant is used in the treatment of skin diseases and fever. Leaves are used topically on burns. Decoction of the leaves is used to sedate the worms and in postpartum pain [122].

Cordia Verbenacea

The species *Cordia verbenacea DC.* Is native to Central and South America [123].In Brazil, its greatest distribution is in the region of the Atlantic Forest and low areas of the Amazon [124]. The crude extract of the aerial parts of the herb (leaves and stems) is widely utilized in popular, medicine in the form of hydroalcoholic extracts, decoctions, and infusions, mainly as antimicrobial, anti-inflammatory, antiulcer, antitumour, antirheumatic and analgesic agents. Pharmacological studies have demonstrated that products obtained from *Cordia verbenacea* have a pronounced antiinflammatory effect with topical and oral administration, associated with low toxicity and substantial protective effect on the gastric mucosa of rodents [125].

Cordia Retusa

Cordia retusa (Vahl.) Masam (Family: Boraginaceae) is an evergreen shrub to undersized tree. The plant *Cordia retusa* disseminated widely in eastern and southeastern Asia from India, Sri Lanka, Burma, Thailand, Indochina, China, Taiwan, Sumatra, Malaysia, Java, Philippines[126]. It was reviewed that the *Cordia retusa* leaf decoction is being used to treat cough and stomach ache, root as antidote. The sap of the leaves is taken internally for three days prior to and later than the menstrual period for three to four months to strengthen fertility. The leaves are used to make a tea which is used for abdominal colic and for the treatment of diarrhea and dysentery. Further, the leaves are anti-inflammatory [127].

Cordia Rothii

Cordia rothii is a tree. It is perennial grows in tropical climate such as Punjab, Sind, Rajputana, Gujarat and Ceylon. It cures wounds, acid reflux, constipation, low back pain, rheumatism, aphthous ulcers, cough, pain, teething problems, ascaris and piles. The decoction prepared from the bark is used as gargle.

Cordia Rufescens

Cordia rufescens A.DC. (Syn: C. piauhiensis Fresen) is a shrub popularly known in Northeastern Brazil as “ramela de velho”. It is used in folk medicine as an abortifacient [128], anti-inflammatory and to treat dysmenorrhea and dyspepsia.

Cordia Salicifolia

Cordia salicifolia Cham (CS) can be found not only in Brazil but also in tropical forest areas of Argentina and Paraguay. This plant belongs to the family Boraginaceae. CS is a very popular herb, used by the Brazilian population as diuretic, blood purifier, and

appetite suppressant and weight loss product [129]. 52 Few experimental or clinical data are available about its pharmacological properties through the PubMed website (www.pubmed.com), but some effects on the cardiovascular system [130], activity as an antiviral agent [131], wound healing actions [132], and cytotoxic action [133] have been described.

Cordia Obliqua

The *Cordia obliqua Willd.* (Clammy cherry) is a flowering plant species in the genus Cordia belonging to the family boraginaceae. Cordia is a genus of flowering plants in the borage family, Boraginaceae. It contains about 300 species of trees and shrubs that are found worldwide, mostly in warmer parts [134] of India and Ceylon. Traditionally *Cordia obliqua* fruits are used for cooling effects, anthelmintic, expectorant and diuretic.

It lessens thirst and scalding of urine, remove pains in the joints and it is used as treatment of diseases of spleen and and leprosy. Stem bark is used as a mild tonic, kernels are a remedy in treatment in ringworm and leaves are used to treat ulcers and head ache externally. Seeds are used as anti-inflammatory [135] and antimicrobial agent.

Conclusion

Ethnopharmacology is one of the world's fastest-growing scientific disciplines encompassing a diverse range of subjects. It links natural sciences research on medicinal, aromatic and toxic plants with socio-cultural studies and has often been associated with the development of new drugs. Most of the traditional uses of plants were scientifically proved in animal models. Some of the activities reported were anti-inflammatory, cytotoxic, antiviral, antimicrobial, antiulcer, hepatoprotective, antidiabetic, antiurolithiatic, antifungal, larvicidal and antiandrogenic activity. Now a days allopathic drugs produces serious side effects compare to plant based drugs. So researchers have switched to medicinal plants for its little or no adverse reactions. This review article collects the information and understandings that are available in different literature reviews, scientific journals, proceedings, pharmacy related books and websites about the traditional medicinal uses of Boraginaceae family.

These data's are beneficial to health professionals and researchers those who worked in pharmacology, phytochemistry, phytopharmacology and related areas. Development of suitable methods for effective isolation of bioactive compounds and reliable analytical techniques are future research perspectives.

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