A Review On The Phytochemical And Pharmacological Characteristics Of Some Indian Medicinal Plants

Singh Rajmeet[1*], Singh Gurvinder Pal[2]

[1*,2]S R University Alwar (Rajasthan), rajmeetsingh80@yahoo.com

ABSTRACT

Herbal remedies have been used since the beginning of human history. Written records from the ancient Chinese, North Africans, and Indians attest to man's resourcefulness in employing plants to treat a wide range of illnesses[1]. Achyranthes aspera Antimalarial, emmenagogue, purgative, diuretic, antiarthritic, oestrogenic, antileprotic, antispasmodic, cardiotonic, antibacterial, and antiviral properties are all associated with Linn. (A. aspera). Alkaloids, flavonoids, saponins, steroids, and terpenoids are said to be present.[2]. Colebrookea oppositifolia is a significant plant for medicine. The leaves have antifertility and oil fungal poisonous properties; they are used locally to treat wounds and fractures; the roots are utilized to cure epilepsy[3]. The characteristics that aid in the identification of this leaf medication include the presence of paracytic stomata, trichomes of glandular, non-glandular, uniseriate, and multicellular kinds, rectangular or druses type calcium oxalate crystals, and acicular raphides. The results of a preliminary phytochemical examination showed that the water extract had carbohydrates, glycosides, and traces of volatile oil; the acetone, ethanol, and water extracts contained phenols, tannins, and flavonoids; the ethanol and water extracts contained saponins, proteins, and amino acids; and the water extract contained gums and mucilage[4]. Granatum Punica from Punicaceae family includes the sacred fruit, which has been used for many purposes in ancient writings. Pomegranates are utilized in several medical systems. The biological characteristics of extracts made from various pomegranate components, such as their hypoglycemic, immunomodulatory, analgesic, and anticancer effects. Because of these qualities, the extracts are employed in a variety of medical specialties, including the treatment of impotence, cholera, inflammation, and infection. Punica granatum was shown to contain anthocynin, flavonoides, alkaloids, tannins, triterpenes, and phytosterols using phytochemical screening.[5].

Key words: Phytoconstituents, Achyranthes aspera, Colebrookea oppositifolia, Punica granatum

INTRODUCTION

Herbal remedies were the first line of defense when pharmaceuticals were first used to treat illness. Herbal remedies are widely used in traditional medical systems around the globe. Examples include Indian systems such as Ayurveda and siddha, Japanese acupuncture, and traditional Chinese medicine[6]. Herbal remedies have also been used since the beginning of human history. Written records from the ancient Chinese, North Africans, and Indians attest to man's resourcefulness in employing plants to treat a wide range of illnesses.[1].

The knowledge that Indians possess about a large portion of the world's medicinal flora is a source of great pride. Traditional Indian medicine has been providing the health treatment that the Indian people have needed since the beginning of civilization. One of the upaveda of the Atharva Veda, Ayurveda, provides strong evidence for the subject's significance to the well-being of society and for its role in recording it. For the most part, these plants' phytochemistry and pharmacology have not been sufficiently studied to warrant consideration for medical application[7].

Dr. Ischirch stated that after medicine has thoroughly destroyed its digestive system with artificial remedies and tested every organ in an animal, it "may assuredly hope that it will return to the most ancient remedies of mankind, to the medicinal plants and drugs for the utility of which the experiences of the thousands of years vouches"[8]. Furthermore, compared to synthetic pharmaceuticals, plant-based medicines offer a higher safety margin and a wider therapeutic efficacy, which has led to their rapid development in the treatment of neurological illnesses[9].

In this review article, we will talk about three plants that were once suggested by the conventional Indian medical system to treat problems of the central nervous system. These plants are still utilized in folk medicine by many Indian populations.

PHARMACOGNOSTIC AND PHARMACOLOGICAL DETAILS OF PLANTS:

1: ACHYRANTHES ASPERA LINN

Achyranthes Linn (A. aspera), a member of the Amaranthaceae family of plants, is a common weed in fields and along Indian roads. These flowers go by numerous names, including "Apamarga," "Latjeera," "Prickly chaff flowers," and so on.

1.1. Vernacular Names

The same plant goes by several names: Apamargamu in Uttareeni, Agatha in Sanskrit, Chirchitta in Hindi, Chirchira in Telugu, Naayurivi and Shirukadaladi in Tamil, Apang and chirchiti in Bengali, and Kadaladi in Malayalam. The state of Madhya Pradesh is called Agya, and its capital city is called Circita Korroci. In Rajasthan, the Aghada and Aghara in Marathi, Katio-bhuratio, Andhi-jalo, and Unta-ghada are well-liked tourist spots. Common foods include the Punjabi cuisine Kutri and Chichra as well as the Oriya meals Apamaranga and Apamargo.[10].

Figure 1. 1 Achyranthes aspera L

The Achyranthes aspera is native to India, but it has spread to many other countries as a naturalized species. There is representation from Asia, Oceania, Africa, Europe, Laos, Thailand, Burma, and the Philippines.[11].

1.3. Description of the Plant

Achyranthes aspera is a perennial plant that can reach heights of 20 to 120 cm. The branches grow in opposite directions on a pubescent, square stem with slightly expanded nodes. The hairy petiole has a length that varies from half a centimeter to an inch and a half. The papery leaf blades have a cuneate or rounded base, an entire or undulating border, and an obtuse apex with a mucro. They range in size from 1.5 to 7 mm. Rachis is thick and heavily hairy, angling towards the end, and bearing erect, 10-15 cm long spikes that reflex following anthesis.Bracts that are 2-4 mm long and taper to a sharp point; bracteoles that are 2.5-4.5 mm long and have a hard, spiky appearance; wings that are 1-2 mm long and have a membranous border all around[12].

1.4. Pharmacognostical Studies

A layer of collenchyma lies beneath the six to ten distinct ridges shown in a transverse section of a juvenile stem. The outermost protective layer is the epidermis, which is single-layered and has a thick cuticle. Trichomes, also known as epidermal warts, are benign growths that appear as multicellular, overlapping lesions on the skin. Calcium oxalate crystals can be found in parenchymatous cells, which are seen in cortical layers 6–8, both as clusters and as rosette-shaped crystals. The xylem is made up of a variety of cell types, including fibers, tracheids, parenchyma, and annular, spiral, and pitted vessels[13].

1.5. Phytochemistry

This plant has been used to extract water-soluble achyranthine and betaine, a derivative of N-methylpyrrolidine-3-carboxylic acid. The plant's ethanol extract produced saponins and alkaloids. Ecdysterone has been detected in the plant's roots, leaves, and seeds. Pentatriacontan, 6-pentatriacontanone, hexatriacontane, and triacontane were isolated from the stem using chloroform. Alkaloids and flavonoids have been proposed as contents of the inflorescence. According to the paper, saponin—later identified as oleanolic acid-oligosaccharide—was detected in 2% of the defatted seeds. The sugar moiety of the saponins consisted of rhamnose, xylose, galactose, and glucose. Two oleanolic acid-based saponins, saponins A and B, were isolated from A. aspera in a different investigation[14].

1.6. Therapeutic Uses Described By Ethnobotanical Studies

Many medical conditions, including snake bites, leukoderma, asthma, whooping cough, bone fractures, edema, piles,

skin eruptions, and colic, have been effectively treated using the plant's numerous constituents. This plant has the potential to be diuretic, astringent, laxative, and purgative, among other actions that may alleviate respiratory ailments. Coughs and fear of water are two conditions when ingesting the flower may be beneficial. The seeds of this plant are emetic, purgative, cathartic, and anti-asthmatic, and have also been used to treat hydrophobia, gonorrhea, and insect stings. Numerous medicinal ailments, including as dog bites, wounds, injuries, intermittent fever, and asthma, can be treated using the plant's leaves. In addition to treating whooping cough, tonsillitis, hemorrhage, cough, hydrophobia, and other ailments, the roots also have anti-asthmatic, diuretic, diaphoretic, and anti-syphilitic properties [10, 15].

1.7. Pharmacological Activities

Antiviral activity: In methanolic preparations of A. aspera leaves, antimicrobial activity against 22 different bacteria, fungi, and yeasts has been demonstrated. A. aspera leaf extracts have been shown to suppress three strains of the papaya virus[16].

Anti-cancer activity: Total methanolic extract successfully inhibited skin carcinogenesis in a mouse model of in vivo two-stage carcinogenesis. The fraction and the total extract have been shown to include inhibitors of malignant tumor growth. It has been demonstrated that A. aspera prevents hepatocarcinoma in rats given CCl4 or N-nitroso-diethylamine. A methanolic extract of A. aspera leaves inhibits the growth of tumors and kills cancer cells, according to in vitro research on pancreatic cancer cell lines[17].

Anti-fertility activity: In a few studies, it has been shown that A. aspera root extracts are spermicidal to rat and human sperm. following being treated to an ethanolic root extract of A. aspera, female albino rats were shown to be less fertile following mating. When tested on female albino rats, the same set of researchers found that A. aspera root extracts had estrogenic and anti-implantation properties[18].

Hepatoprotective activity: A methanolic preparation of aerial A. aspera protects albino rat liver tissue from rifampicin toxicity. The saponin-rich fraction of A. aspera has been shown to possess antioxidant, hypolipidemic, and hepatoprotective qualities[19].

Nephro protective activity: The nephrotoxicity of lead acetate is prevented in male albino rat kidneys by a methanolic extract of the complete A. aspera plant[20].

Antidiabetic activity: A. aspera seed ethanolic extract dramatically lowered blood sugar levels in streptozotocin-induced diabetic mice. The aqueous, and methanolic extracts of A. aspera have been shown to have a hypoglycemic effect in both normal and alloxan-induced diabetic rabbits. In diabetic rats given alloxan, ethanolic extracts of A. aspera were found to possess anti-hyperglycemic and antioxidant qualities [21].

Anti-inflammatory activity: The ethanolic extract of A. aspera has demonstrated anti-inflammatory and antiarthritic properties in both acute and chronic inflammatory conditions in animals. According to Vetrichelvan and Jegadeesan's research, which used albino male rat models of cotton pellet granuloma and hind paw edema generated by carrageenan, the alcohol extract of A. aspera exhibited anti-inflammatory properties. Khuda et al. demonstrated the anti-inflammatory effectiveness of a topical preparation of methanolic leaf extract (cream) of A. aspera in male Wistar rats by inducing hind paw edema by the use of carrageenan. Furthermore, the cream's in vitro experiments demonstrated that it reduced lipoxygenase activity [22.]

Immunomodulatory activity: Seed extract from A. aspera has been reported to have immunomodulatory and antioxidant effects, which help fish that have been vaccinated against Aeromonas hydrophila[23].

Antimicrobial Activity: Extracts of A. aspera seed produced with either ethanol or chloroform shown antimicrobial efficacy against B. subtilis, E. coli, and P. aeruginosa. Extracts from A. aspera's leaves exhibited antibacterial and antifungal properties against Escherichia coli, Pseudomonas aeruginosa, Proteus vulgaris, Staphylococcus aureus, and Klebsiella species [24].

Anti-allergic activity: Leukocytosis and eosinophilia in milk-allergic male Swiss albino mice were studied after being exposed to an extract of A. aspera aerial parts high in petroleum ether[25].

Wound Healing Activity: The ability of A. aspera leaf extracts in ethanol and water to heal wounds was evaluated using excision and incision wound models, respectively. Methanolic leaf extract from A. aspera was used to assess experimental wound healing in rats that were subjected to excision and incision. Enhancing the healing of burn wounds in rats with the use of A. aspera leaf extract treated with methanol [26].

Anti-oxidant Activity: The aspera fraction rich in saponins has antioxidant, hypolipidemic, and hepatoprotective properties. After being extracted in ethanol and water, A. aspera leaves demonstrated their ability to scavenge free radicals, specifically superoxide and DPPH radicals. A. aspera demonstrated reduced lipid peroxidation and free radical scavenging activity. Rats given a methanolic extract of A. aspera leaves for burn wounds demonstrated a considerable increase in antioxidant capacity and wound healing[27].

Hypolipidemic Activity: Researchers found that both control and triton-induced hyperlipemic rats' lipid profiles were improved by an ethanolic extract of A. aspera. A. aspera aqueous extract produced both hypolipidemic and anti-hyperlipidemic effects in rats given sesame oil as part of their diet[28].

Neuropharmacological activities: There have been several descriptions of A. aspera's effects on the central nervous system, including antidepressant, anticonvulsant, anxiolytic, nootropic, and related. Studies on animals have demonstrated encouraging outcomes in the treatment of convulsive disorders when an extract from the roots of A. aspera is administered via methanol. Researchers discovered that mice's memory and learning were enhanced by a methanolic root extract of A. aspera[29, 30, 31].

2: COLEBROOKEA OPPOSITIFOLIA SMITH

The Lamiaceae flower genus Colebrookea was created in 1806. It is now known that only one species—Colebrookea oppositifolia—actually inhabits this area. The densely woolly shrub Sm. C. oppositifolia, which is native to subtropical regions like India, has been used for centuries in traditional Indian medicine to treat a variety of ailments, such as rheumatoid arthritis, epilepsy, head injuries, and bone fractures, among many others[32].

2.1. Vernacular Names

Kannada: Thuggi Gida; Telugu: Jolidi, Tolisi; Tamil: Vitupucittalai; Marathi: Bhaman, Bhamini, Bhamni; Oriya: Tulia; Hindi: Binda, Kala-Bansa, Pansra, Bhirmoli.

Figure 1.2 Colebrookea oppositifolia smith

2.2. Distribution and Habitat

The nations where C. oppositifolia is primarily found are India, Pakistan, southern China, Burma, Nepal, Indo-China, and Thailand. The plant can be found in many parts of India that have elevations between 250 and 1700 meters, including the Himalayas (from Kashmir to Bhutan), the Punjab, the Western Ghats, and the Hilly Areas of South India[33].

2.3. Description of the Plant

The multi-stemmed Indian Squirrel Tail (Colebrookea oppositifolia) shrub reaches a maximum height of three meters. Young plants contain many tiny, hairy branches and pale green stems. The light green leaves are oppositely oriented and thicken toward the tips of the tree's twigs. The underside of the leaves, which has a paler green color than the top, is hairy. The leaves are lanceolate in outline, oblong in shape, and coarsely serrated, ranging in length from 10 to 15 cm. On spiking panicles, tiny white flowers, measuring just 5 to 10 centimeters in length, blossom. Hair resembling a squirrel's tail at the terminals of flower spikes [34].

2.4. Pharmacognostical Studies

Transverse slices of leaf and stem showed abundant evidence of vascular bundles, parenchyma, collenchyma, cortex, cambium, pith, and so forth, along with the architecture of other cell types. Histochemical study of a cross-section of the leaf and stem revealed the presence of lignin, Ca2+ oxalate crystals, volatile oils, and tannins along with concentrated hydrochloric acid, Sudan III, and ferric chloride. Powdered leaf tissue contained glandular trichomes, spiral vessels, lignified fibers, and lignified tracheids; powdered stem and inflorescence tissue contained parenchyma, collenchyma, papillose cells, covering trichomes, spherical pollen grains, uniseriate tapered trichomes, and corolla[35].

2.5. Phytochemistry

Relative to C. oppositifolia, compounds from its several sections have been the subject of extensive study by noteworthy scientists. In particular, we have isolated two new flavonoid aglycones: 5, 7, 2'-trihydroxyflavone-2'-O—D-glucopyranoside and negletein -6-O—D-glucopyranoside. Verbascoside, which goes by the names Acteoside and Kusaginin, is a newly discovered acylated flavone glycoside belonging to the Phenylethanoid family. It was extracted from the root extract of C. oppositifolia. The antifungal active component acteoside was found in C. oppositifolia leaves. Well-known substances include apigenin, caffeic acid, anisofolin A, tanetin, mosloflavone, flindulatin, 5,6,7-

trimethoxy baicalein, tanetin, scutellarein 4′-methyl ether, and apigetol. However, the quercetin content of leaf extracts from C. oppositifolia was assessed for a novel 14, 15-dinor-cis-labdane diterpene known as (+) - 14, 15-dinor. Five compounds were extracted from a petroleum ether extract of C. oppositifolia leaves; all five were ferulic esters. Researchers have successfully isolated 4, 5, 6, 7-tetramethoxy flavones, a novel flavonoid glycoside, betulonic acid, -sitosterol, triacontane, and triacontanol from the ethanolic root extract of C. oppositifolia.[33,34,35].

2.6. Therapeutic Uses Described by Ethnobotanical Studies

This plant has long been used in traditional medicine to treat epilepsy, and the leaves are ground into a paste that is given topically to wounds and bruises. Numerous medical conditions, including as dermatitis, epistaxis, bleeding, hemoptysis, ringworm infection, and other skin disorders, have been treated using C. oppositifolia. Because the leaves provide a juice, they can be consumed to treat fever and to ease headaches. Those with dysentery had their lesions treated with a leaf poultice. The Gujjars, Boa, Tharus, and some of the indigenous people of India have all employed the plant's crushed powder and decoction to cure epilepsy in traditional medicine. For the treatment of epilepsy, C. oppositifolia is used by a number of native communities. Moreover, a root infusion can be used to cure peptic ulcers, and consuming the inflorescence's juice helps relieve sinusitis and other digestive issues[36].

2.7. Pharmacological Activities

Antifertility, antiulcer, antimicrobial, hepatoprotective, cardioprotective, antioxidant, anti-inflammatory, wound-healing, and antibacterial properties have all been associated with various constituents of C. oppositifolia. The biological activities of the plant have not been thoroughly assessed, but there is much room for more research in this area in the future.

Antifertility activity: In male Wister rats, ethanolic extract from C. oppositifolia leaves reduces fertility [37].

Antiulcer activity: Animal models of peptic ulcer disease have demonstrated antiulcer efficacy in response to an alcoholic extract of C. oppositifolia roots [38].

Hepatoprotective activity: Hepatoprotective Acteoside was isolated from C. oppositifolia plant tops[39].

Antimicrobial activity: The essential oils of C. oppositifolia have antifungal properties. A study on the antibacterial properties of a C. oppositifolia root extract revealed that 12 constituents were in charge of these outcomes. They contained eleven well-known flavonoid compounds and one novel diterpene molecule. Acteoside and other antifungal substances extracted from the leaves and stems of C. oppositifolia were examined for their potential synergistic effects[33].

Anti-oxidant activity: Root methanol extract of Cassia oppositifolia has antioxidant properties[40].

Cardioprotective activity: An ethanolic C. oppositifolia leaf extract's cardioprotective properties against doxorubicin-induced oxidative stress and cardiotoxicity in rats [41].

Anti-inflammatory activity: Animal studies show that a methanolic extract of C. oppositifolia leaf has anti-inflammatory effects[36].

Wound healing activity: It has been proven that both water and alcohol extracts of C. oppositifolia leaves accelerate wound healing in animal models[42].

3: PUNICA GRANATUM LINN

The pomegranate tree, or Punica granatum Linn., is a tiny tree or deciduous shrub of the Punicaceae family. This tree produces highly sought-after fruit. Researchers have examined several plant sections over the past 20 years, and they have produced a wealth of fascinating findings from the phytochemical, pharmacological, and therapeutic viewpoints[43].

Figure 1. 3 Punica granatum L

3.1. Vernacular names

Sanskrit: Dadimah; English: Pomegranate; Kannada: Dalimbe; Hindi: Anar; Tamil: Madalam; Telugu: Dadima; Malayalam: Matalam[44].

3.2. Distribution and habitat

P. granatum only occurs naturally in the western Iranian Mountains and northern India. It has been grown and established for eons in India, the East Indies, Malaya, tropical Africa, and the arid regions of Southeast Asia[45].

3.3. Description of the plant[46]

A big deciduous shrub or small tree, it reaches heights of 6-10 meters, has smooth, thin, gray bark, and is typically equipped with tiny thorns on either the axils or the tips of its branches.

Leaves: Opposite, oblong-lanceolate, oblong-elliptic, or oblong oblanceolate, glabrous, whole, minutely pellucid-punctate, bright green below and shiny above; petiole very short. Measures 2.5–6.3 cm.

Flowers: With a maximum length and width of 3.8 to 5 cm, these blooms are typically found alone, however they can sometimes occasionally be observed in groups of two or four. They are found at the terminals of incredibly small branches, which are frequently mistakenly described as axillary when they are actually sessile or almost so.

Calyx: In addition to the ovary, there are five to seven coriaceous, valvate tubular appendages.

Petals: There are five to seven obovate, crimson, wrinkled petals between the calyx lobes, counting the sepals.

Stamens: The calyx has many elliptical, longitudinally dehiscing anthers that are positioned at different levels underneath the petals.

Ovary: Long, curved, and inferior in appearance; the cells are organized in two concentric rings; capitate stigma.

Carpels: They quickly linked together into two distinct groups, symbolized by the numerals 3 and 5–9 to represent the bottom and top levels, respectively, due to their different beginning locations.

Fruit: The calyx-limb is used to crown the globose-shaped fruits. They are between 3.8 and 7.5 cm in diameter. The carpels' coriaceous, woody, and internally septate rind is covered in a membrane. Numerous angular seeds are present in each carpel, and these seeds are forced together by their neighbors. **Seeds:** It has a horny inner coat and a watery, pink-juiced outside.

3.4. Pharmacognostical Studies

A transverse slice of leaf tissue from the Punica granatum L. plant was made, exposing the upper and lower epidermis. In the epidermis, anomocytic and anisocytic stomata were observed. Compared to the rachis, the lamina has a reduced density of unicellular trichomes. These plants were characterized by non-lignified phloem, lignified xylem, and arc-shaped vascular bundles. Crystals of calcium oxalate with prism and cluster shapes were discovered. Transverse leaf slices revealed the presence of both spiral and annular xylem arteries.[47,48].

3.5. Phytochemistry

The hydrolyzable tannins punicalin, gallic acid, punicalagin, ellagic acid, and ellagic acid derivatives including ellagic acid, 3,3'-di-O-methyl, ellagic acid, 3,3', 4'-tri-O-methyl, and ellagic acid, 3'-Omethyl-3,4-methylene are the main bioactive ingredients of P. granatum. Other phenolic chemicals that may be present in plants include pedunculagin, punicacortein A-D, granatin A and B, punicafolin, punigluconin, corilagin, valoneic acid dilactone, and malic acid. P. granatum has been shown to contain a variety of compounds, including gallic acid, protocatechuic acid, chlorogenic acid, caffeic acid, ferulic acid, ortho- and para-coumaric acids, catechin, phloridzin, flavonoids, including flavonols like luteolin, quercetin, and kaempferol, and many more. [49,50.]

3.6. Therapeutic Uses Described By Ethnobotanical Studies

It has been shown that P. granatum L. has a broad variety of biological effects, such as antioxidant, antibacterial, anticancer, anti-inflammatory, anti-diabetic, neuroprotective, and so on[51].

3.7. Pharmacological Activities

Anti-oxidant activity: Promising results have been seen from the use of several P. granatum components as possible sources of antioxidant protection[52].

Antimicrobial activity: It has been demonstrated that P. granatum's leaves, peel, fruit extracts, and isolated components exhibit antibacterial activity against a variety of bacteria, fungi, and viruses [53].

Anti-cancer activity: Numerous in vitro and in vivo cancer models have demonstrated P. granatum's anti-cancer activity, and the plant's peel, leaves, fruit, and isolated components have all demonstrated this effect[54,55].

Anti-obesity activity: Several in vitro and in vivo models have demonstrated the hypolipedemic, antihyperlipidemic, and anti-obesity properties of various P. granatum extracts and whole plants [56].

Anti-inflammatory activity: Many in vitro and in vivo models of acute and chronic inflammation have proven the anti-inflammatory properties of P. granatum[57].

Hepatoprotective activity: Strong evidence supporting P. granatum's hepatoprotective properties may be found in both in vitro and in vivo liver injury models. Examples of such substances include carbon tetrachloride, arsenic, trichloroacetic acid, ferric nitrilotriacetate, and others of a similar nature[58].

Anti-diabetic activity: Numerous research investigations have shown P. granatum to have anti-diabetic properties, which is in line with the plant's common folklore medicinal use as a diabetic remedy. Specifically, research is being

done on the anti-diabetic properties of fruit and peel extracts and isolated ingredients[59,60] .

Neuropharmacological activities: Scientific study using P. granatum extracts and components like punicalin has proven neuroprotective characteristics, such as those of an antidepressant, an Alzheimer's therapy, a Parkinson's disease treatment, and so on[61].

Cerebroprotective activity: Standardized pomegranate extract protects Wistar rats from ischemia-reperfusion damage. Punicalagin from P. granatum may be able to shield rats' brains from harm during ischemia and reperfusion. P. granatum's neuroprotective properties prevented brain damage in newborn mice exposed to hypoxia[62].

Conclusion:

The focus of efforts needs to be on strategies that will improve the efficiency, efficacy, and sensible application of medicinal plants, particularly by incorporating them into national and local health policies and initiatives. A. aspera is a highly significant plant, according to the literature review, because of its several medical uses and its chemical constituents, which include ecdysterone, achyranthine, betaine, pentatriaontane, 6-pentatriacontanone, hexatriacontane, and tritriacontane. Numerous pharmacological properties of the plant have been demonstrated, including spermicidal, anti-allergic, cardiovascular, nephroprotective, antiparasitic, hypoglycemic, analgesic, and antipyretic properties. Numerous traditional uses, including those for urinary tract infections, different forms of stomach problems, purgatives, laxatives, antiasthma, and anticholera, are also documented.

Colebrookea oppositifolia Smith is a member of the Lamiaceae family. In addition to its antifertility properties, this plant is one of the major medicinal herbs used to treat rheumatoid arthritis, fractures, cuts, and bruises. The entire plant, its roots, leaves, and occasionally its flowers have therapeutic qualities. The entire plant, its roots, leaves, and occasionally its flowers have therapeutic qualities. This family's primary components include amino acids, triterpenoids, glycosides, flavonoids, and tannins. Research on the Punica granatum L. (pomegranate) has been endless, ranging from chemistry to biotechnology to production and conservation methods, and from the biological effects to anti-microbial antioxidant, anti-inflammatory, anticancer, and anti-diabetic effects, among other applications.

REFERENCES:

1) Petrovska BB. Historical review of medicinal plants' usage. Phcog Rev 2012;6:1-5.
2) Uma A. Bhosale et al. Effect of aqueous extracts of Achyranthes aspera Linn. on experimental animal model for inflammation. Anc Sci Life. 2012 Apr-Jun; 31(4): 202–206.
3) Yadav DK, Pharmacognostical, Phytochemical and Pharmacological profile of Colebrookea oppositifolia Smith, Journal of Drug Delivery and Therapeutics. 2019; 9(6-s):233-237.
4) Varadharajan Madhavan et al. Pharmacognostical studies on the leaves of Colebrookea oppositifolia Smith[J]. , 2011, 6(4): 134-144.
5) Nizamul Haque et al. A comprehensive review of phytochemical and pharmacological profile of Anar (Punica granatum Linn): A heaven’s fruit, Journal of Ayurvedic and Herbal Medicine 2015; 1(1): 22-26.
6) Kala, C.P. (2017). Traditional Health Care Systems and Herbal Medicines. European Journal of Environment and Public Health, 1(1), 03.
7) V. J. Thakar. Guest Editorial Historical development of basic concepts of Ayurveda from Veda up to Samhita. Ayu. 2010 Oct-Dec; 31(4): 400–402.
8) Sofowora et al., Afr J Tradit Complement Altern Med. (2013) 10(5):210-229.
9) Martins Ekor. The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. Frontiers in Pharmacology. January 2014, Volume 4, Article 177.
10) Sanyogita Singh et al. Int. J. Pharm. Sci. Rev. Res., 48(2), January - February 2018; Article No. 01, Pages: 1-7.
11) Vijai Lakshmi et al., An Overview of Achyranthes aspera Linn. Journal of Scientific and Innovative Research 2018; 7(1): 27-29
12) DeFilipps RA, Krupnick GA (2018). The medicinal plants of Myanmar. PhytoKeys 102: 1–341.
13) Vinayak Upadhya et al., Preliminary pharmacognostic screening of Achyranthes coynei stem, Journal of Ayurveda & Integrative Medicine, April-June 2015, Vol 6, Issue 2, page 134-138.
14) Charde et al., Achyranthes Aspera Linn. (Chirchira): A Magic Herb In Folk Medicine., International Journal of Biomedical and Advance Research., 2011,02,06 page no. 228-240.
15) Saba Hasan., Pharmacological And Medicinal Uses Of Achyranthes Aspera., International Journal of Science, Environment and Technology, Vol. 3, No 1, 2014, 123 – 129.
16) Yadav, et al.: Evaluation of antibacterial activity of Achyranthes aspera extract against Streptococcus mutans, J. Adv. Pharm. Technol. Res. Oct-Dec 2016, Vol 7, Issue 4, page no 148-152.
17) R Kartik et al., Amelioration effects against N-nitrosodiethylamine and CCl4-induced hepatocarcinogenesis in Swiss albino rats by whole plant extract of Achyranthes aspera., Indian J Pharmacol. 2010 Dec; 42(6): 370–375.
18) M.M Anuja et al., Spermicidal action of a protein isolated from ethanolic root extracts of Achyranthes aspera: an in vitro study., Phytomedicine 2011 Jun 15;18(8-9):776-82.
19) Nahian Fyrose Fahim, Zakia Sultana Sathi (2018) Assesment of Hepatoprotective Activity of Roots and Barks of Achyranthes aspera in Carbon Tetrachloride-Induced Hepatotoxicity in Rats. Malaysian Journal of Halal Research, 1(2) : 23-26.

20) Jayakumar, T et al., Experimental studies of Achyranthes aspera (L) preventing nephrotoxicity induced by lead in albino rats. Journal of Health Science (2009). Volume 55 Issue 5 Page Numbers 701-708.
21) Muhammad Shoaib Akhtar, Javed Iqbal., Evaluation of the hypoglycaemic effect of Achyranthes aspera in normal and alloxan-diabetic rabbits. Journal of Ethnopharmacology Volume 31, Issue 1, January 1991, Pages 49-57.
22) F Khuda et al., Anti-inflammatory activity of the topical preparation of Valeriana wallichii and Achyranthes aspera leaves. Pak J Pharm Sci. 2013 May; 26(3):451-4.
23) R.Thangamani., Effect of water extract of Achyranthes Aspera Linn. leaves on the neutrophil activity to heat killed Aeromonas Hydrophila in oreochromis mossambicus (Peters). International journal of phytopharmacy research., Vol 5, Issue 3, 2014, 173-177.
24) Sarvanan et al., Antimicrobial Activity of Leaf Extracts ofAchyranthes aspera Linn., Asian Journal of ChemistryVol. 20, No. 1 (2008), 823-825.
25) S. B. Datir et al., Evaluation of antiallergic activity of the various Extracts of the aerial part of achyranthes aspera Var. Porphyristachya (wall. Ex moq.) Hook.f., Pharmacologyonline 3: 921-925 (2009).
26) Abraham Fikru., Evaluation of in vivo wound healing activity of methanol extract of Achyranthes aspera L. Journal of Ethnopharmacology Volume 143, Issue 2, 28 September 2012, Pages 469-474.
27) Talukder FZ et al., In vitro free radical scavenging and anti-hyperglycemic activities of Achyranthes aspera extract in alloxan-induced diabetic mice. Drug Discov Ther. 2012;6(6):298-305.
28) S. Krishnakumari, Priya. K., Hypolipidemic Efficacy of Achyranthes aspera on Lipid Profile in Sesame oil fed Rats., Ancient Science of Life Vol : XXV (3&4) January, February, March, April, May, June 2006.
29) Bhosale UA et al., Study of central nervous system depressant and behavioral activity of an ethanol extract of Achyranthes aspera (Agadha) in different animal models. Int J App Basic Med Res 2011;1:104-8.
30) Divya Bhargavan, suchetha Kumari, Deepa B., Evaluation of nootropic activity of achyranthes aspera leaves extract in wistar rats December 2018 Asian Journal of Pharmaceutical and Clinical Research 11(12):218.
31) Gawande D Y, Goel R K., Pharmacological validation of in-silico guided novel nootropic potential of Achyranthes aspera L., J Ethnopharmacol., 2015 Dec 4:175:324-34.
32) Shirsat R P, Suradkar S S., Macroscopic, phytochemical and fluorescent analysis of Colebrookea oppositifolia smith, International Journal of Applied Research, Page 222-224.
33) Yadav DK, Pharmacognostical, Phytochemical and Pharmacological profile of Colebrookea oppositifolia Smith, Journal of Drug Delivery and Therapeutics. 2019; 9(6-s):233-237.
34) Darshan Kathait et al., Phytochemical and pharmacognostic study of colebrookea Oppositifolia smith., IJMPR 2021, 5(1), 200-206.
35) Peron G et al., Comprehensive Characterization of Secondary Metabolites from Colebrookea oppositifolia (Smith) Leaves from Nepal and Assessment of Cytotoxic Effect and Anti-Nf-κB and AP-1 Activities In Vitro, Int. J. Mol. Sci. 2020, 21, 4897.
36) Gollapalle Lakshminarayanashastry Viswanatha., Ameliorative potential of Colebrookea oppositifolia methanolic root extract against experimental models of epilepsy: Possible role of GABA mediated mechanism, Biomedicine & Pharmacotherapy Volume 90, , June 2017, Pages 455-465.
37) R S Gupta et al., Antifertility studies of Colebrookia oppositifolia leaf extract in male rats with special reference to testicular cell population dynamics., Fitoterapia, 2001 Mar;72(3):236-45.
38) MM Ghaisas et al., Antiulcer Activity of Colebrookea oppositifolia Sm, Research J. Pharmacology and Pharmacodynamics 2(1): Jan. – Feb. 2010: 66-70.
39) Tauheeda Riaz et al., Colebrookia oppositifolia: A valuable source for natural antioxidants, Journal of Medicinal Plants Research Vol. 5(17), pp. 4180-4187, 9 September, 2011.
40) Nosheen Akhtar et al., Phytochemical analysis and comprehensive evaluation of antimicrobial and antioxidant properties of 61 medicinal plant species, Arabian Journal of Chemistry Volume 11, Issue 8, December 2018, Pages 1223-1235.
41) Shyamanta Haloi et al., In vivo cardioprotective activity of colebrookea oppositifolia, Int J Pharm Sci Bio 2010;1(4):245-249.
42) Katare AK., Colebrookea oppositifolia Sm., An Important Hepatoprotective Phytopharma Plant in Drug Discovery, New India Publishing Agency New Delhi, Page 55-82.
43) Bazilla Naseer et al., Pomegranate (Punica granatum)—Morphology, Taxonomy, Composition and Health Benefits, Fruits Grown in Highland Regions of the Himalayas Springer Nature Switzerland AG 2021,page 131-143.
44) Kumari I, Kaurav H, Chaudhary G, Punica granatum L. (Dadim), Therapeutic Importance of World's Most Ancient Fruit Plant, Journal of Drug Delivery and Therapeutics. 2021; 11(3):113-121.
45) Ali Khadivi et al., Morphological variability of wild pomegranate (Punica granatum L.) accessions from natural habitats in the Northern parts of Iran, Scientia Horticulturae Volume 264, 5 April 2020.
46) T. K. Lim., Punica granatum, Edible Medicinal And Non-Medicinal Plants. 2012 Nov 3 : 136–194.
47) Homa Rajaei, Parisa Yazdanpanah., Buds and leaves in pomegranate (Punica granatum L.): Phenology in relation to structure and development, Flora, 2015, 61-69.
48) Diab, R.Y.A. and Eltahir, A.S. (2019) Pharmacognostical Study of the Fruit Peels of Punica granatum. Open Access Library Journal, 6: e5687.

49) David Heber., Herbal Medicine: Biomolecular and Clinical Aspects. 2nd edition, CRC Press/Taylor & Francis; 2011.
50) Tandokazi Pamela Magangana et al., Processing Factors Affecting the Phytochemical and Nutritional Properties of Pomegranate (Punica granatum L.) Peel Waste: A Review, Molecules 2020, 25, 4690 page 1-34.
51) Maria G. Miguel et al., Pomegranate (Punica granatum L.): A medicinal plant with myriad biological properties - A short review, Journal of Medicinal Plants Research Vol. 4(25), pp. 2836-2847.
52) Anna Caruso et al., Pomegranate: Nutraceutical with Promising Benefits on Human Health, Appl. Sci. 2020, 10, 6915.
53) Amy B. Howell, Doris H. D'Souza., The Pomegranate: Effects on Bacteria and Viruses That Influence Human Health, Evidence-Based Complementary and Alternative Medicine Volume 2013, Article ID 606212, page 1-11.
54) Shahindokht Bassiri-Jahromi., Punica granatum (Pomegranate) activity in health promotion and cancer prevention, Oncology Reviews 2018; volume 12:345.
55) Amrita Devi Khwairakpam et al., Possible use of Punica granatum (Pomegranate) in cancer therapy, Pharmacological Research, Volume 133, July 2018, Pages 53-64.
56) Middha S K., A Review on Antihyperglycemic and Antihepatoprotective Activity of Eco-Friendly Punica granatum Peel Waste, Evidence-Based Complementary and Alternative MedicineVolume 2013, Article ID 656172, 10 pages.
57) Mastrogiovanni F., Anti-Inflammatory Effects of Pomegranate Peel Extracts on In Vitro Human Intestinal Caco-2 Cells and Ex Vivo Porcine Colonic Tissue Explants, Nutrients 2019, 11, 548; page 1-15.
58) Ali H., Hepatoprotective Potential of Pomegranate in Curbing the Incidence of Acute Liver Injury by Alleviating Oxidative Stress and Inflammatory Response, Front. Pharmacol. 12:694607.
59) Tang D et al., Anti-diabetic Effect of Punica granatum Flower Polyphenols Extract in Type 2 Diabetic Rats: Activation of Akt/GSK-3β and Inhibition of IRE1α-XBP1 Pathways. Front. Endocrinol. 9:586, October 2018, Volume 9, Article 586.
60) Pottathil S et al., Mechanisms of Antidiabetic Activity of Methanolic Extract of Punica granatum Leaves in Nicotinamide/Streptozotocin-Induced Type 2 Diabetes in Rats, Plants 2020, 9, 1609, Page 1-15.
61) Sarkar S., Neuroprotective and Therapeutic Strategies against Parkinson's Disease: Recent Perspectives, Int. J. Mol. Sci. 2016, 17, 904.
62) Sancaktutar AA et al., The protective effects of pomegranate extracts against renal ischemia-reperfusion injury in male rats. Urol Ann 2014;6:46-50.