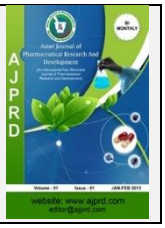
Available online on 15.2.2025 at http://ajprd.com

Asian Journal of Pharmaceutical Research and Development

Open Access to Pharmaceutical and Medical Research



Open Access

Research Article

Bauhinia Spp.,- Kachnar : Medicinal Plant Biodiversity, Geographical Distribution, Bioactive Phytochemical Constituents And Their Ethno-Pharmacology, Therapeutics Medicinal Values

Pawan Kumar Sagar*[1], Sajwan S[1], R Murugeswaran[2]

*[1]Drug Standardization Research Institute, (Under CCRUM, Ministry of AYUSH., Govt. of India) , PCIM & H Campus, Kamla Nehru Nagar, Ghaziabad,U.P., India.,

[2] National Medicinal Plant Board, Indian Red Cross Society, New Delhi-110001, (Ministry of AYUSH, Govt. of India)

A B S T R A C T

Ethno-Pharmacological, bioactive phytochemical constituents, therapeutic uses, geographical distribution, medicinal potent values studies of ASU herbal single drugs / products remains a significant challenging task on global levels. There needs to be more than the advance investigation research studies and screening scientific research data's studies to emphasized and explored of ethno-pharmacology and therapeutic medicinal potent values of ASU plants/ products authentication, medicinal and therapeutics important aspects. *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR, Kachnar are one of the medicinal plants used to treat and cure of various therapeutic illness of public mankind from since ancient time. This study aims to evaluate the bioactive phytochemical constituents, Ethno-Pharmacological, geographical distribution, therapeutic medicinal potent values, an comprehensive review studies of the plant of *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR. As per the literature, this genus possesses antimicrobial, antifungal, antidiarrheal, antistress, antioxidant, nephroprotective, anticancer, hepatoprotective, antidiabetic, anti-inflammatory, and antidepressant activities commonly both *In-vitro* and *In-vivo,* due to the presence of Alkaloids, flavonoids, steroidal, glycosides, terpenoids, tannin, phenolic, saponins, lignins, proteins and phenolic acids, bauhinioxepins, chromanones, compounds and Quercetin, β-sitisterol (Anticancer and Antitumor) bioactive compounds. However, more research is needed to explore the *In-vivo* clinical evaluation for their future uses application in treating various ailments for beneficial to public, mankind. Keywords: *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR., bioactive phytochemical constituents, Ethno-Pharmacological, geographical distribution, Biodiversity, and therapeutic medicinal potential values, electronic search engine databases.

Keywords: Ethno-Pharmacological, nephroprotective, antidiarrheal, antistress, *Phytochemical Constituents*

A R T I C L E I N F O: Received 15 Sept. 2024; Review Complete 27 Dec. 2024; Accepted 19 Jan 2025. ; Available online15 Feb. 2025

Cite this article as:

Sagar PK, Sajwan S, R Murugeswaran, *Bauhinia Spp.*,- Kachnar : Medicinal Plant Biodiversity, Geographical Distribution, Bioactive Phytochemical Constituents And Their Ethno-Pharmacology, Therapeutics Medicinal Values , Asian Journal of Pharmaceutical Research and Development. 2025; 13(1): 55-65-, DOI: http://dx.doi.org/10.22270/ajprd.v13i1.1504

*Address for Correspondence:

Pawan Kumar Sagar, *1Drug Standardization Research Institute, (Under CCRUM, Ministry of AYUSH., Govt. of India) , PCIM&H Campus, IInd Floor, Kamla Nehru Nagar, Ghaziabad,U.P., India.,

INTERODUCTION:

The genus *Bauhinia* belonging to the family of Fabaceae, has attracted the attention of modern researchers and ancient traditional vaidyas and Hakims due to its immense medicinal potential. The *Bauhinia* species are also called 'cow's paw or cow's hoof' due to the shape of their leaves. [1] Medicinal plants have been used as traditional treatments for numerous human diseases for thousands of years and in many parts of the World. Hence, researchers have recently paid attention to safer phytomedicines and biologically active compounds isolated from plant species used in herbal medicines with acceptable therapeutic index for the development of novel drugs.[59,71] Historically, plants and natural products have been widely used in folk medicine as traditional remedies. Moreover, their use in primary healthcare has been expanding rapidly, with complementary and alternative medicine becoming mainstream in both developing and developed countries due to the wide acceptance of natural remedies and their perception as generally safe. Now, plant-

based natural products play an important role in modern drug development, owing to the diversity and structural complexity of their metabolites and their unique properties. In fact, plants have contributed to the development of many drugs either directly or indirectly by using the core structure of natural bioactive metabolites as scaffolds. For example, morphine, which is found in *Papaver somniferum*, was the first natural product introduced and used as a therapeutic drug in 1826. And aspirin was developed as a semi-synthetic drug in 1899 to treat pain, fever, and inflammation, as a derivative of salicilin from *Salix alba*. Other examples of plant-derived drugs include Paclitaxel from *Taxus brevifolia*, which is chemotherapeutic agent used for the treatment of various cancers, and Artemisinin from *Artemisia annua*, used for the treatment of multidrug-resistant malaria, to name a few. For many years, numerous species of this genus have been employed for treating diabetes.[1] cancer, malaria, liver dysfunction, inflammation and depression[1] has been used and utilization *Bouhinia* wild world wide occurrence B. *Spp*. by Asian tribal's peoples, communities. for hilling various therapeutics aliments and useful application from since ancient time. This genus is widely distributed across the globe, specifically in Asia. It is a diversified tropical and subtropical genus with about 300 species worldwide. Out of 74 reported species in Asia, only 20 have been reported for their medicinal potential and phytochemistry. These species include *B. acuminata, B. blakeana, B. championii, B. ferruginea Roxb., B. foveolata Dalzell, B. galpinii, B. integrifolia, B. kockiana, B. malabarica, B. monandra Kurz, B. phoenica, B. purpurea, B. racemosa, B. retusa, B. saccocalyx Pierre, B. scandens, B. strychnifolia Craib, B. tomentosa, B. vahlii, B. variegata*. Various species of the *Bauhinia* plant have been used for centuries in Ayurveda and Unani, to treat various ailments. *B. racemosa* has been used to treat the initial stages of cancer and tumor. [1,21] while *B. variegata to* cure fevers, stomach disorders, and skin diseases, by tribal communities. The roots of this plant were also used to treat snake venom and dyspepsia, among other things. In Ayurveda, *B. variegata* was used to treat worm infestations, scrofula, cervical lymphadenitis, and wounds, while Unani practitioners used it to treat leprosy, asthma, and liver complaints. [1] Similarly, *B. acuminata* was used to treat a variety of conditions, such as coughs, urinary problems, ulcers, and hypertension.[1,34] Meanwhile , *B. monandra* Roxb. was traditionally used as a diuretic and emmenagogue and to heal wounds and fight dysentery Finally, *B. phoenica* was used to treat skin allergies, diabetes, and fungal infections.[1] We have investigation studies and focus here in this comprehensive review of Ethano-Pharmagcological, bioactive phytochemical constituents, theraputic uses, geographical distribution, medicinal potent values of *Bauhinia Spp.*(Kachnar) - *Bauhinia variegate* L., *Bauhinia purpurea* L. *Bauhinia blakeana* L., *Bauhinia acuminate* L., *Bauhinia tomentosa* L., While *Bauhinia Spp*.-.(BV, BP, BB, BA, BT, BR). have been confirmed and now patent Indian Species of bauhinia *B. acuminate*, *B blakeana*, B. galpinii, *B. grandidieri*, *B. monandra*, *B. phoenicea*, *B. purpurea*, *B. racemosa*, *B. rufescens*, *B. tomentosa*, *B. variegate*.[1,34]

Bauhinia Spp.- BV,BP,BB,BA,BT,BR studiesed herbasious medicinal plant, various parts and their investigated *In-vitro* or *In-vivo* studies Graphical Illustration, investigated plant Ethano-Pharmacological and theraputic medicinal potent values confirmation and identification, authenticated conscious review research data's shown in Fig.-1 respectively.

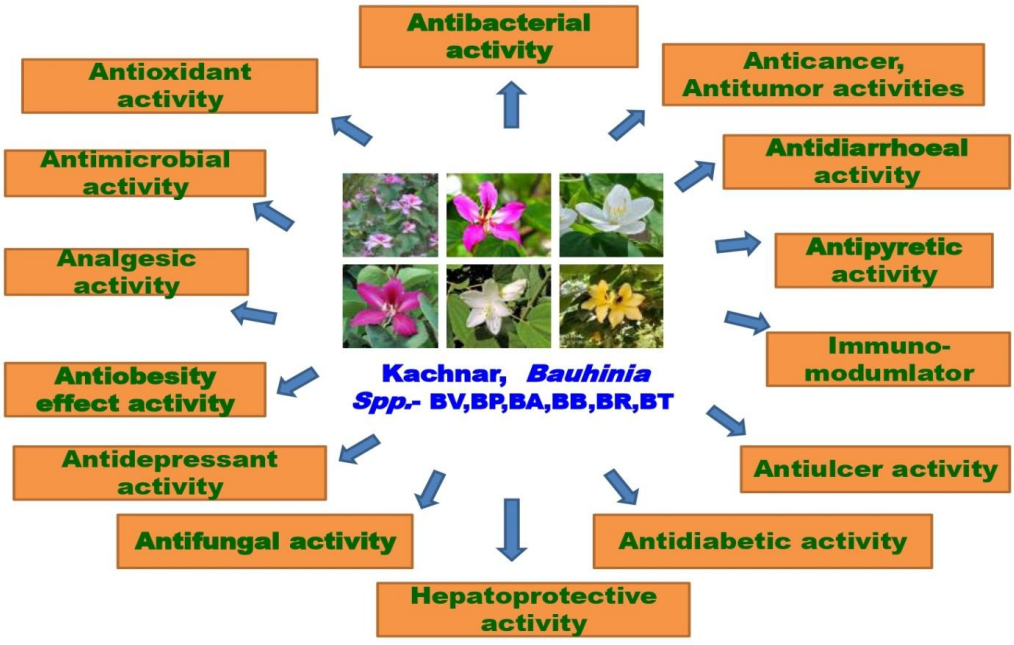


Figure-1: Graphical Illustration

Methods: [1,16,22,33,62]

Methodology

An extensive literature search was conducted using the Google search engine, Google Scholar and PubMed databases to gather relevant information for this comprehensive review. The main keywords used for the search were "genus *Bauhinia*," "*Bauhinia Spp.*- BV,BP,BB,BA,BT,BR," "*Bauhinia* species across Asia," "geographical distribution,""ethno pharmacological," "ethno botanical uses," "bioactive phyto chemical constituents," "therapeutic medicinal potential values," "pharmacological activities," "toxicological studies," and "patents." Other databases were also used to collect information, including the Web of Science. The information was rigorously gathered from Google Scholar, Pub Med, Elsevier, Wiley Online Search, Science Direct, and other literature sources of standard methods basis.

Traditional Therapeutics Medicinal values of *Bauhinia Spp.*:

***Bauhinia variegate* L.:** It is being utilized as a medicine for curing of obesity, glandular in fammation. [20,64] Young leaves - boiled and eaten as a vegetable, or pickled, Flowers and flower buds - boiled and eaten as a vegetable, or pickled, Fruits - boiled and eaten as a vegetable, or pickled, Seed - much appreciated, The juice of the flowers is used to treat diarrhea, dysentery and other stomach disorders, The root is used as an antidote to snake poison, A decoction of the root is used to treat dyspepsia, The dried buds are used in the treatment of piles, dysentery, diarrhea and worms, The bark is alterative, anthelmintic, astringent and tonic, The juice of the bark is used in the treatment of amoebic dysentery, diarrhoea and other stomach disorders, A paste of the bark is useful in the treatment of cuts and wounds, skin diseases (including leprosy), scrofula and ulcers, Edible uses - Young leaves - boiled and eaten as a vegetable, or pickled, Flowers and flower buds - boiled and eaten as a vegetable, or pickled, Fruits - boiled and eaten as a vegetable, or pickled, Seed - much appreciated. [1,3,5]

***Bauhinia purpurea* L.:** Whole plant parts used traditionally for therapeutics hilling as In south-East Asia various parts of are used as poultice to reduce swelling, bruises and to ripen the ulcerations and boils. Plant decoction taken orally for the treatment of fever, diarrhea and dysentery. The whole plant is preferred for the management in dropsy, pain, rheumatism, convulsions, delirium and septicemia. Naga tribes are preferred this plant as an antidote to certain toxins and poisons. Root part - Root is work as carminative while infusion of small pieces of root is given in the management of white spot on skin. Dried root powder is given with water by Oraons tribes to treat rheumatism while Mundas tribes topically used dried root powder with mustered oil in equal ration as balm on cuts and wounds. Bhoxa tribes used the bark as an astringent to treat diarrhea, Root bark parts - Root bark past mixed with rice water (3:1) for ripening of boil is preferred by Lodhas tribes. Root bark with curd is preferred for hemorrhoids while its paste with dried ginger given internally to treat goiter., Stem part - In Assam region, Khasi tribes and non-tribal are used its stem for healing of bone fracture. Stem park- The pounded stem bark is given by Lodhas people to cure the rheumatism problem. Mundas tribe is used stem bark past to heal the bone fracture. Stem bark decoction is given orally twice in a day to cure the asthma or other respiratory disorders by overcome the inflammation of respiratory tract. Bark is used topically for the management of skin diseases. Various Indian folk people are used its, bark as antidote and applied in glandular diseases. Strong decoction of bark is used by tribal people of Jalgon district to treat lymph swelling. Raw bark juice is given to overcome the problem of menstrual trouble while with honey orally given against leucorrhoea. Bark is used by Khasi tribes and non tribal people of Assam region to cure small pox. Leaves part- Malays people preferred the plant leaves for the treatment of sores and boils. In India, plant leaves are given as cough remedy. The plant leaves are recommended in south India, Sikkim, Bengal, Bihar and Orissa in the treatment of jaundice, wound and in stomach tumor. Flowers part - Recommended as laxative by the Malays people to treat constipation. Flower jam also called "Pushpa Gulakanda" is recommended for the treatment of constipation. Flower bud and ghee fried flower are given to the patient those are suffering from dysentery. However, flower bud also used as laxative. In Assam region, Khasi tribes and non-tribal people are used its flower in case of indigestion. Pod and Seed parts - In Michilka LDA, Adamawa State Nigeria, the pods are preferred as plaster for the old and fresh wound healing. Indian tribal and non-tribal people of different regions use the plant pod and seeds as tonic and to overcome the problem of libido. [2,4,26,64-66,]

***Bauhinia acuminate* L.:** In India Leaves was used in Paste Bladder stone, scrofula, leprosy, asthma, proctotosis and digestive diseases, skin disease.[50] In Indonesia Bark Boiled of B A used in Common Cold, In Thailand Roots Macerated of B A used in Cough, In Thailand Flowers Paste of B A used in Headache and Hypertension in India Flowers Paste of BA , Ulcers And Leprosy in Japan Roots cold extract of BA used Cough, In India Leaves of BA macerated used in Biliousness, inflammatory, In India Leaves paste used in throat troubles, In India leaves/root of B A used as a Tonic Drugs for liver. [34] In Javanese Roots of B A cold Extract used and administrative as Cough, In India Root Hot of B A Extraction used in Urinary Problems, In Malaysia Roots boiled of B A used in Ulceration of the Nose, In India Bark Decoction of B A Biliousness.[77]

***Bauhinia tomentosa* L.:** The root bark is vermifuge. It is used internally to treat conditions of the large intestine, An infusion of the root bark is used as an external application to treat inflamed glands, abscesses and skin conditions, The stem bark is astringent. It is used as a gargle for the mouth. The flowers are used as a remedy for dysentery and diarrhea. The fruit is said to be diuretic, An infusion of the rind is used as an astringent gargle, The seed is eaten as a tonic and aphrodisiac, A paste of the seed made with vinegar is used as a local application to the wounds produced by venomous animals., The leaves are an ingredient in a plaster applied to abscesses, Inflamed glands, Abscesses, Dysentery. [11,48]

Table1: *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR Nomenclature : [1-12,18-20]

Species:	*Bauhinia variegate*	*Bauhinia purpurea*	*Bauhinia blakeana*	*Bauhinia acuminate*	*Bauhinia tomentosa*	*Bauhinia racemosa*
Kingdom:	Plantae	Plantae	Plantae	Plantae	Plantae	Plantae
Clade:	Tracheophytes; Angiosperms; Eudicots; Rosids	Tracheophytes; Angiosperms; Eudicots; Rosids	Tracheophytes; Angiosperms; Eudicots; Rosids	Tracheophytes; Angiosperms; Eudicots; Rosids	Tracheophytes; Angiosperms; Eudicots; Rosids	Tracheophytes; Angiosperms; Eudicots; Rosids
Order:	Fabales	Fabales	Fabales	Fabales	Fabales	Fabales
Family:	Fabaceae	Fabaceae	Fabaceae	Fabaceae	Fabaceae	Fabaceae
Genus:	Bauhinia	Bauhinia	Bauhinia	Bauhinia	Bauhinia	Bauhinia
Tribe:	Bauhinieae	Bauhinieae	Bauhinieae	Bauhinieae	Bauhinieae	Bauhinieae
Botanical name	*Bauhinia variegate* L.	*Bauhinia purpurea* L.	*Bauhinia blakeana* L .	*Bauhinia acuminate* L.	*Bauhinis tomentosa* L.	*Bauhinia racemosa* L.

Table-2: Biodiversity and Geographical Occurrence of *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR : [1-2,3-11,13-15]

Sr.No.	Investigated Plant Species	Biodiversity and Geographical Occurrence
01.	*Bauhinia variegate* L.	Native to an area from China through Southeast Asia to the Indian subcontinent. Common name include Orchid tree. [3,28]
02.	*Bauhinia purpurea* L.	Found South China and India but naturally distributed in Nepal, Bhutan, Pakistan, Shri Lanka, Myanmar and Thailand Native to the Indian subcontinent and Myanmar, mounted at 1300 m altitude in Himalaya but rare in southern region of India, found in various regions of USA including Hawaii, Coastal California, Southern Texas and Southwest Florida, Common names include orchid tree, purple bauhinia, camel's foot, butterfly tree and Hawaiian orchid tree. [2,4,17,52]
03.	*Bauhinia blakeana* L.	Weston Hong Kong Island, Paris Mission Paris, Asian region in India, Myanmar, China, Hong Kong, Common name include Hong Kong Orchid tree, Flowers appeared and shown bright pinkish purple or purplish red flowers occurrence. [7]
04.	*Bauhinia acuminate* L.	Native to tropical southeastern Asia, Malaysia, Indonesia (Java, Borneo, Kalimantan , Lesser Sunda Islands), Javanese, Thailand, Japan and the Philippines. Common name include dwarf white bauhinia, white orchid-tree and snowy orchid tree. [8,34,30]
05.	*Bauhinia tomentosa* L.	South Africa, Mozambique, Zimbabwe, Tropical Africa, India and Sri Lanka, Common name include Yellow bell orchid tree. Widespread in Africa from Ethiopia southwards to KwaZulu-Natal in South Africa; also in Malaysia. [9,11,38,72,75]
06.	*Bauhinia racemosa* L	Native to Southeast Asia, the Indian subcontinent and China Asian countries, across India, western Himalayas, in Ceylon, China, and Timor, Common name include bidi leaf tree. [7,10,21,27,45-47,54]

Table3: Kachnar, *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR Active phyto-chemical constituents:

Sr. No.	*Bauhinia Spp.*- Kachnar	Botanical and Local Name	Active phyto-chemical constituents
01.		*Bauhinia variegate* L. Bright pink or white colour's of flower's, हल्के गुलाबी, सफेद रंगों बाला कांचनार	Flowers has investigated and shown malvidin-3-diglucoside, cynidin3-glucoside,peonidin-3-diglucoside, malvidin-3-glucoside,quercitroside, rutoside, isoquercitro -side, taxifolinerhamnoside, kaempferol-3-glucoside, Myricetrol, ascorbic acid, aspartic acid, glutamic acid, keto acids, octadecanoic acid, amino acids, apigenin, tannins. and Leaves Crude protein, phosphorus, calcium, Leaves Crude protein, phosphorus, calcium, lupeol, carbohydrates, vitamin C, reducing sugars, Saponins, fibers, quercetin, quercitrin, β-sitisterol, terpenoids, kaempferol-3-glucoside, tannin, rutin, heptatri acontane-12,13-diol 7 dotetracont-15-en-9-ol ellagic acid, catechol, sterols, tannins, oil, alkaloids, fats, lignin, glycoside, phenolics, apigenin-7-o-glycoside amides, Stem Bark lupeol, kaempferol-3-glucoside, β-isosterol, 5,7 dimethoxy favanone-4-o-L, rhamno pyrosyl-β-Dglycopyranoside, hentriacontane, stigma sterol, octacosanol, reducing sugars, nitrogenous substances, Root Bark favanone (2S)-5, dihydro dibenzoxepin,7-dimethoxy-3,4methylene dioxyfavon one 5,6b dihydroo-1,7-dihydro-1,7 dihydroxy-3,4-di methoxy-2-methyldibenz

			oxepind, Stem β-sitosterol, naringenin 5,7 dimethyl ether 4-rhamnoglucoside, lupeol, Roots favonol glycosides 5,7,3,4 tetrahydroxy-3-methoxy-7-o-α-L rhamnopyranosyl (1-3)-o-β-D- galactopyranoside, Seeds Oleic acid, palmitic acid, linoleic acid, stearic acid, proteins. steroids, terpenoids, and flavonoids shown and present in BV. [1,12,20,36-37,44,53]
02.	 	*Bauhinia purpurea* L. Purple colour of flower's, बैंगनी फूलों के रंगों बाला कांचनार	Plant Contained and shown - Bauhinia Purpureal linn contain major class of secondary metabolites are glycosides, flavonoids, saponins, triterpenoids, phenolic compounds, oxepins, fatty acids and phytosterols, Leaves part - Lupeol, stigmasterol, lanosterol, ergosterol, beta-tocopherol, phytol, palmitic acid, methyl palmitate, octadecadienoic acid and octadecanoic acid, Stem bark part- 5,7-dihydroxy in 5,7-dimethoxyflavanone-4-O-a-L-rhamnopyrosyl-ß-D glycopyranoside, Kaempferol-3-glucoside, lupeol, Seeds part - Proteins, fatty oils containing oleic, linoleic, palmitic and stearic acids, Flowers part - Peanut, Malvi, Peony in Kaempferol and Root part contained and shown Flavanol-glycosides. The leaves of *B. purpurea* also afforded a mixture of phytol fatty esters, leutin and β-sitosterol , The aqueous methanolic extract of the fresh flower of BP gives flavonoid quercetin and flavonoid glycosides isoquercitrin, astragalin, butein 4' O-β-L-arabinopyranose-O-β-D-galactoside (mp 265º) isolated from the seed of B P The seed oil was characterized by a relatively high amount of phytosterols, where in the sterol markers were β-sitosterol and stigmasterol. B-Tocopherol was the major tocopherol isomer with the rest being d-tocopherol 32. B P seed is a source of galactose and lactose-binding lectin, a peptide which interacts with carbohydrate. steroids, terpenoids, and flavonoids shown and present in B P. [1,12,18,52]
03.	 	*Bauhinia blakeana* L. Striking purplish red flowers colour of flower's, आकर्षक बैंगनी लाल फूलों के रंगों बाला कांचनार	Flowers contain and shown flavonoids like rutin, quercetin, apigenin, apigenin-7-O-glucoside, (2S)-5,7-dimethoxy-3',4'- methylenedioxy flavanone, kaem pferol-7,4′-dimethyl-ether-3-O-β-Dglucopyranoside, and kaempferol-3-O-β-D-glucopyranoside, phenolic constituents e.g., flavonoids, tannins, phenolic acids, etc. α-glucosidase and Medicinal plant investigated and shown tannins, flavonoids, saponins and polyphenols active phyto chemical constituents. Transferrin (Transferrin, TRF, TF), Flowers parts of BB has been shown and investigated TF-binding active performed Anyi-tumor activity, Twenty-five flavonol glycosides and eight phenolic acids, flavonoids and phenolic acids related compounds. [19,49,61]
04.		*Bauhinia acuminate* L. White colour of flower's, सफेद फूलों के रंगों बाला कांचनार	B A investigated and showed the presence of palmitic acid, three phallic acid esters, gallic acid and ursolic acid.[34] The leaves and stems of BA showed the presence of carbohydrate, phenolic compounds, saponins, flavonoids, oils, and fats, alkaloids, anthocyanoside, steroids, anthraquinone, terpenoids, resins, amino acid, sugars and cardiac glycosides in phytochemical screening. GC-MS analysis of detected hexamethyl cyclotrisiloxane B A and 1-methyl 3-nonyl indene in leaf and stem extracts. (Sebastian *et al*.,2020)[34] leaf oil identified 19 compounds B A through GC-MS analysis has been shown β-Caryophyllene, α-Humulene ,Isomethyl-α-ionone, α-Farnesene,β-Ionone, Caryophyl leneoxide1,6, 10-Dodecatrien-3-ol,3-hexen-1-ol,Humul ene epoxide Caryophyllene oxide, caryophyl, Humul ene epoxide, Caryophylla-4(12),8(13)-dien-5α-ol,α-Muurolol,αCa dinol and Isoaromadendrene (Sebastian *et al*.,2020; Vasudevan *et al*.,2013) Phytochemical screening of plant extracts showed the presence of saponin, alkaloid, cardiac glycosides, flavonoids, and tannin and steroid compounds. [34,50]

			
05.	 	*Bauhinia tomentosa* L. Yellow colour of flower's, पीले फूलों के रंगों बाला कांचनार	Flower's part of *Bauhinia tomentosa* L. has shown and indicated the presence of lignins, saponins,sterols, alkaloids and phenols, Flavonoid percentage content of 15.80%, alkaloids percentage content of 5.61% and saponins percentage content of 2.1%, hydroxyphenyl), hydroxypropane, hydroxyflavone, Alkaloids, Sterols, Phenols, Saponins, Lignins [48,59,63] Tetrahy drofurazone-3,4-diol, 1,2-Benzenediol, 2-Propyl phenol, Sucrose, R)-3-(4-(hydroxy methyl) phenyl) propane-1- ol, Levo dopa,(2R,3S,4R,5R)-2,4,5,6-tetra hydroxy-3-meth oxy hexanal,1-Methyl cyclohexane-1,2,3,4,5,6-hexol, [R-(Z)]-Methyl-12-acetoxyoctadec-9-enoate,Butyliso but yl phthalate, (9E,12E)- methyl octadeca-9,12-dieno ate ,Dibenzylsulfane,4-(benzy loxy)-1-methoxy-2-((E)-3,7-dimethylocta-2,6-dienyl)-benzene,1S,3E,4S)-3-[(2 E)-2-[(1R,3aS,7aR)-1-[(E,2R ,5R)-5,6-Dimethyl hept-3-en-2-yl]-7a,methyl-2,3,3a,5, 6,7-hexahydro-1H-inden-4-ylidene]ethylidene]-4-methyl cyclohexan-1-ol.[51]
06	 	*Bauhinia racemosa* L White colour of flower's सफेद फूलों के रंगों बाला कांचनार	(2S)-1,2-di-O-linolenoyl-3-O-α-Galactopyranosyl(1-6) -O-β-galacto-pyranosyl glycerol, (2S)-1-O-linolenoyl-2-O-palmitoyl-3-O-α-galacto-pyranosyl(1→6)-O-β-gal actopyranosylglycerol, (2S)-1-O-oleoyl -2-O-palmito yl-3-O-α-Galactopyranosyl (1→6)-O-β-galactopyrano syl glycerol,4-Notrophenol-Alkaloids investigated and isolated from Leaves part, Epiaflechin,(+)-Epicatechin, Bauhinoxepin F, 2-methoxy-6,6,8-trimethyl-5,6,11,12-tetrahydro-4bH-benzo [6,7]cyclohepta[1,2,3-de] chro mene-1,9-diol,6,6,8-trimethyl-5,6,11,12-tetra hydro -4 bH-benzo [6,7] cyclohepta[1,2,3-de]chromene-1,2,9-triol,6-octen-1-ol, 3,7-dimethyl -,propanoate, Citro nellyl butyrate- Flavonoids investigated and isolated from Leave part, Pacharin, De-O-methylracemosol- Flavonoids investigated and isolated from Hard wood part, Kaemferol, Quercetin, Kaempferol 3-O-β-glucoside, Myricetin 3-O-β-glucoside, Quercetin 3-O-rhamnoside - Flavonoids investigated and isolated from Aerial part, Methyl gallate, Gallic acid - Tannins investigated and isolated from Aerial part, Neophytadiene, Racemosol, Pacharin, Lupeol, β-sitosterol, β-amyrin, - Terpenoids investigated and isolated from Leaves, Hard wood, stem bark, Flower buds, Protocatechuic acid, Phenol,2,4-bis (1,1-dimethylethyl), Epicatechin, Resveratrol - Phenols investigated and isolated from Leaves and Hard wood extracts, Octacosyl ferulate - Propanoids investigated and isolated from Leaves part, Hexacosan-1-ol, 16-heptadecenal, Octacosanol, Octa cosan - Lipids investigated and isolated from Leaves and stem bark parts, Myo-Inositol, α-amyrin - Steroids investigated and isolated from Leaves and stem bark parts, Scopoletin, Scopolin - Coumarin investigated and isolated from Leaves part of plant BR., steroids, terpenoids, and flavonoids shown and present in BR. [1,12,21,25,27,45-47,54]

Table 4: Ethno-pharmacological Therapeutics, medicinal potential values, uses of *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR ::

Sr. No.	Investigated Plant Species	Plant parts shown in In-*vitro* , In-*vivo* studies	Therapeutics, pharmacological medicinal potential values and uses of *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR :
01	*Bauhinia variegate* L.	young fresh leaves, dried leaves, fruits, flowers, root, dried buds, stem bark	Investigated BV medicinal plant Antidiarrhoeal, Antidiabetic, antioxidant, anti-hyperlepidemic activity, antifungal, Antimicrobial, Hypoglycemic, Molluscicidal efect, Anti cancerous activity, Anti-tumor, Antiulcer, Immunomodulatory effect, Haematinic, Antimicrobial, Hepato-protective, Antioxidant, Antibacterial, Anticarcinogenic, antioxidant, Antiobesity effect, Antiulcer, Anti-inflammatory, Wound healing and nephroprotective effect, Antimutagenic and antioxidant activity Haemagglutinating in various In-*vitro* and In-*vivo* studies, Flowers investigated and shown Antidiabetic properties. Plant parts shown and investigated anti-arthritic, fibrinolytic and cardioprotective properties.[1,12,20,23,24,32,36-37,44]
02	*Bauhinia purpurea* L.	dried whole plant, leaves , pods and leaves, stem bark , root bark, root	Investigated BP medicinal plant Anti-inflammatory activity, chemo protective Antitumor activity, Anti-ulceractivity, Anti-diabetic activities, Anti-nociceptor activity, Anti-hyper lipidemic activity, Antioxidant activity, Antimicrobial activity, Neuro pharmacological Activity, Antipsychotic Activity, Anti-analgesic activity, roots, stems, pods and leaves parts-Anti-cancer, Flowers extract investigated and shown Anti-cancer activity, Bark part- Anti-Obesity, Stem bark part- Anti-inflammatory and Anti-arthritic activity , Leaves, bark, roots parts- Cytotoxic activity, Anti-fungal, Leave part –Anti-noceptive, Anti Inflammatory and Antipyretic activity, Wound Healing Activity. Plant parts shown and investigated cardio protective, hepatoprotective, nephroprotective and fibrinolytic properties. [1-2,12,17,26,57]
03	*Bauhinia blakeana* L.	dried whole plant, leaves, and leaves stem bark , bark,	Medicinal plant Flowers extract of BB investigated and shown Anti-depressant activity.[1] Antioxidanxt, Antidiabutic activities, Anti-microbial, Anti-bacterial and enzyme inhibitory activity, Anti-tumor activity due to confirmation of Transferrin (TF) anti-tumor compound TF binding activity performed. [19,49,61]
04	*Bauhinia acuminate* L.	dried whole plant, leaves and leaves, stem bark , bark,	Antioxidant activity, Antidiabetic activity, Antibacterial activity, Hemolytic Activity, Anti-Nociceptive Activity, Brain shrimp lethality test activity, Membrane stabilizing activity, Antihelmintic activity, Antidiarrheal study, Hepatoprotective Activity, Anticancer Study, Nano synthesis activity. [34,39,40-42,56-58]
05	*Bauhinia tomentosa* L.	dried flower and root part	Investigated BT medicinal plant shown In In-*vitro* studies of flower part has investigated and shown Antibacterial activity. [59,63] B T has been investigated and shown Antimicrobial, antioxidant and Anti-inflammatory, Antioxidant, Antidiabetic, Cancer preventive, Antiasthmatic, Anticancer and Diuretic. [51] B T. investigated and shown Antibiotic sensitivity and Antibacterial activity.[59,70] Investigated , confirmed in an In-*vitro* studies in root part - Antioxidant and Antimicrobial medicinal values in various In-*vitro* and In-*vivo* studies. [9,68-69]
06	*Bauhinia racemosa* L.	fresh leaves, dried leaves fruits, flowers ,root, buds, stem bark, hard wood	Investigated Medicinal plant parts of BR shown Anti-bacterial and anti-fungal activities, Anti-inflammatory activity, Antioxidant effects, Anti-helminthic activity, Anti-filarial activity, Analgesic activity, Anti-ulcerative effects, Anti-cancer activities, Anti-histaminic activities, Anti-pyretic activities, Anti-diabetic effects, Larvicidal activity, Anti-HIV-1 activity, Anti-Toxicity properties in various In-*vitro* and In-*vivo* studies, Heart wood extract investigated and shown Hepato protective activities, anti-arthritic, cardio protective, nephro protective , fibrinolytic, and wound healing properties. [1,12,21,25,27,43,47,45-46,54-55,60,74]

RESULT AND DISCUSSION:

Bauhinia species have been traditionally used to treat various diseases such as diabetes, diarrhea, cough, fever, stomach and skin disorders from since ancient time in Asian countries, India and other countries tribal and non-tribal rural area people's of different regions used the plant parts for the curing and treatment of various infections, disorders as a folk medicines. Each and every part of the plant contains numerous bioactive compounds as mentioned in the review, which has health promising effects in one or the other form (Kumar *et al*. 2020). Graphical Illustration shown in Fig.-1 respectively.

Geographical distribution and morphological features:

Bauhinia genus includes erect, small, deciduous to semi-deciduous or medium-sized evergreen shrubs 6 to max. 16 feet heights trees. The morphological features vary amongst of *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR, but the genus is famous for the characteristic camel's foot shape of its leaves and bearing flowers ranging from white, yellow to purple and red colour's Morphologically, *B. blakeana* L., *B.acuminate* L., *B. vahlii* L. could be distinguished by being a huge evergreen climber with numerous pairs of coiled revolute tendrils. Its branches bear numerous large blobbed hairy leaves and Pinkish and white flowers. *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR, evergreen occurred in various sizes shrub trees found in max. 5 to 16 feet's height, Geographically there biodiversity dispersed World wide, mostly in USA including Hawaii, Coastal California, Southern Texas and Southwest Florida and found in Asian countries South China and but naturally distributed in Nepal, Bhutan, Pakistan, Shri Lanka, Myanmar, Thailand and Native to the southern and northern region of India and Indian subcontinent, Naturally geographically, biodiversity

distributed, occurrence in wild and forest area of various regions of southern and northern region of India region's and Asian countries. Hence *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR. have been utilized needed tribal and non-tribal rural area people's of different regions used the plant parts for the curing and treatment of various infections, disorders as a folk medicines from since ancient time. Nomenclature and geographically, biodiversity, occurrence and distribution of *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR shown in Table-1 and Table-2 respectably.[1,16,22,33,62]

Bio-active phytochemical profile:

Remarkable numerous bioactive phytochemicals have been identified from the species of genus *Bauhinia*, *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR These phytochemicals include Alkaloids, flavonoids, flavones, steroidal, glycosides, terpenoids, tannin, saponins, lignins, proteins and phenolic acids fatty acids, diglycosides, bibenzyls, chalcones, phenolic compounds, and derivatives of acids. These are responsible for a wide range of pharmacological activities and therapeutic medicinal potential values. In this section, we have summarized those bio active phytochemicals comprehensive review reported by various research groups. Revealed research data' profiling basis. In this comprehensive review we have observed that *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR shown numerous remarkable, immense bioactive phytochemical constituents as Quercetin and β-isosterol various flavonoids compounds of *Bauhinia variegate* L. separated and isolated from leaves and stem bark plant parts, β-sitosterol compounds of *Bauhinia purpurea* L. separated and isolated from stem and seed oil plant part, Transferrin, TF -binding active and Quercetin compounds of *Bauhinia blakeana* L. separated and isolated from flowers plant part, various flavonoids of *Bauhinia acuminate* L. separated and isolated from leaves, flowers and stem bark plant parts, various flavonoids of *Bauhinia tomentosa* L. separated and isolated from flowers plant part, Quercetin and β-sitosterol compounds of *Bauhinia racemosa* L separated and isolated from Leaves, hard wood, stem bark, flower buds plant parts. These compounds have been shown Anticancer and Antitumor activities in various *In-vitro* or *In-vivo* investigated trails. [1,12,17-21,25,34,36,48-51] Bio-active Phytochemical profiling of *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR shown in Table-3 respectably

Ethno-Pharmacological activities and therapeutic medicinal potential values:

Genus *Bauhinia* studies have shown, investigated, demonstrated the therapeutic and medicinal benefits of the *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR. these extracts, and the bio active chemical constituents. It has been reported to shown anticancer, antitumor, antidiabetic, antidiarrheal, antifungal, antimicrobial, antimalarial, anti-inflammatory, antinociceptive, antioxidant, antipyretic, hepatoprotective, anti-arthritic, cardioprotective, wound healing properties and analgesic, Anti-depressant activity using a variety of *In vitro* and *In vivo* evaluations and have been investigated, discussed in the revealed research data's ethno pharmacological activities profiling and therapeutic medicinal potential values. [1-2,11-15,17,19-21,23-27,32,34,40-43,45-48,51,54] Ethno- Pharmacological activities and therapeutic medicinal potential values profiling *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR shown in Table-4 respectably.

Patents of Asian species of *Bauhinia*

The genus *Bauhinia* In India, the patents surrounding, emphasize the ongoing research and potential of this genus, providing fascinating glimpse into its unique application having these *B. Spp.* showing and consists remarkable, immense Pharmacological, therapeutic medicinal potential values. *Bauhinia Spp.*-.(BV, BP, BB, BA, BT, BR). has been confirmed and patent Indian species of bauhinia *B. acuminate*, *B blakeana*, *B. galpinii*, *B. grandidieri*, *B. monandra*, *B. phoenicea*, *B. purpurea*, *B. racemosa*, *B. rufescens*, *B. tomentosa*, *B. variegate.* [1,34]

Regulatory challenges or considerations for using Bauhinia species in medicinal products.

Bauhinia species, with their diverse pharmacological and therapeutic medicinal properties, hold immense potential for medicinal applications with ethno-botanical and ethno-pharmacological avenues in different regions of World wide of various regions of southern and northern region of India region's and Asia regions. However, their integration into pharmaceutical formulations requires having product acceptability, clinical studies involving quality, safety and efficacy. The potential regulatory challenges includes standardisation, quality control, quality assurance, chemical variability, making standardization of bioactive phytochemical compounds of its products pharmacovigilance have challenging task. Variations in cultivation and sustainable conditions on the basis of these Geographical distribution and biodiversity occurrence can also be explore and reinvestigation for future advance research and product acceptably point of views. [1,15,34]

CONCLUSION:

Bauhinia species in the World wide and in the Asian countries, while also discussing bioactive phytochemical constituents, and ethno-pharmacological potential, biodiversity, geographical distribution studies. Various bio active phytochemical constituents have been isolated and identified from the different botanical parts of plants belonging to the genus *Bauhinia Spp.*- Kachnar, BV,BP,BB,BA,BT,BR including Alkaloids, flavonoids, steroidal, glycosides, terpenoids, tannin, phenols, saponins, lignins, proteins and phenolic acids, Quercetin, β-sitisterol (Anticancer and Antitumor) bioactive compounds having remarkable, immense therapeutics, ethno-pharmacological medicinal potential. The scientific research on *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR has been suggested a huge biological potential of this plant parts. The phytochemical variation and efficacy of the medicinal values of *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR are dependent on geographical locations. It is strongly believed that detailed information as presented in this comprehensive review on the bioactive phytochemical and various ethno-pharmacological biological properties of the extracts might provide detailed evidence for the use of this medicinal plant Spp. in different medicines. Even today, medicinal plant is the almost exclusive source of novel drugs development for a majority of the world population. Therefore, it remains a challenge task for the scientist to provide efficient, quality based safe and cheapest medication with product acceptability in Global market and especially for the rural area for medically curing of needed rural mass population. These *Bauhinia* species and their quantification of individual

phytoconstituents as well as a pharmacological profile based on *In-vitro*, *In-vivo* studies and on clinical trials should be needed further investigated. Further studies are required to identify, isolate, and elucidate the structures of novel bio-active constituents present in investigated studies *Bauhinia Spp.* apply upon GC-MS, LC-MS, XRD, SEM-EDX advance sophisticated instruments techniques of these investigated medicinal plant *B. Spp.* scan still be carried out for purposes of advance research. that contribute to its health benefits. Besides, more evidence, especially through *In-vivo* and clinical trials, is necessary to determine the mechanisms involved in the bioactivities mentioned previously. Even though there are available preliminary data on the medicinal and nutritional values of *Bauhinia Spp.*- BV,BP,BB,BA,BT,BR Whole plant, root bark, root, seeds parts information is still lacking, especially on other parts of the plant, such as the Leaves, Flowers, Root, Stems bark. Stem thus, studies on the these plant parts of *Bauhinia Spp.* also be done and investigated to discover potential bioactive compounds that can be exploited for discover novel drug development and health advantages .

Limitations and Future Remarks of the Study:

The present studies data's of bioactive phytochemical constituents, and ethno-pharmacological potential, biodiversity, geographical profiles shown the reconfirmation and presence of DSR, PV of investigation medicinal plant of *Bauhinia Spp.*- Kachnar, BV,BP,BB,BA,BT,BR In the future, investigated data may be used to Advance revalidation, Drug Standardization Research, Pharmacopeial atlas monographs profiling development, novel drug development, investigation of novel bioactive marker constituents, bioactive compounds mechanism of actions, Pharmacovigilance aspects and reconfirmation of these valuable investigated resulted data's.

Ethical approval:

As the work is purely an In-*vitro* study, ethical clearance is not required.

REFERENCES:

1. Verma R, Dash S, Ankita, Thakur S, Kumar R, Singh G, Kaur C. Genus *Bauhinia* (Fabaceae): A review from phytochemistry to pharmacology- Exploring traditional uses and toxicological insights across Asia. Journal of Phytomedicine. 2024;vol-135,156246.
2. Gupta N, Kondalkar S A, Arya M, Bharthi V,Paul B, Kondalkar A, Meena AK. pharmacognostical, phytochemical, HPTLC and ethano-botanical study of *Bauhinia purpurea* L. pod. International Journal Pharmaceutical Science and Research. 2024;15(3):889-899.
3. Anonymous. Useful Tropical plants - *Bauhinia variegate* L. 2024a. ; https://tropical.theferns.info/view tropical.php?id=Bauhinia+variegata
4. Anonymous. Flora and Funa: *Bauhinia purpurea* L. 2024b. https://www.nparks.gov.sg/florafaunaweb/ flora/2/7/2750
5. Anonymous. Online Google search engine 2024c; https://en.wikipedia.org/wiki/Bauhinia_variegata#:~:text = Bauhinia%20variegata%20is%20a%20species,family%20Orchidaceae) %20and%20mountain%20ebony.&text=(L.)
6. Anonymous. Online Google search engine 2024d; https://en.wikipedia.org/wiki/Bauhinia_purpurea#:~:text=Bauhinia%20 purpurea%20is%20a%20species,tree%2C%20and%20Hawaiian%20orc hid%20tree.
7. Anonymous. Online Google search engine 2024e; https://en.wikipedia.org/wiki/Bauhinia_%C3%97_blakeana#:~:text=Ba uhinia%20%C3%97%20blakeana%20(bow-HIN,and %20 striking%20purplish%20red%20flowers.
8. Anonymous. Online Google search engine 2024f; https://en.wikipedia.org/wiki/Bauhinia_acuminata#:~:text=Bauhinia%2 0acuminata%20is%20a%20species,tree%20and%20snowy%20orchid% 2Dtree .
9. Anonymous. Online Google search engine 2024g; https://en.wikipedia.org/wiki/Bauhinia_tomentosa
10. Anonymous. Online Google search engine 2024h; https://en.wikipedia.org/wiki/Bauhinia_racemosa
11. Anonymous. Online Google Search engine 2024i; https://tropical.theferns.info/viewtropical.php?id= Bauhinia +tomentosa
12. Gudavalli D, Pandey K, Gopal EDE V, Sable D, Ashwini S, Ghagare, Kate AS. Phytochemistry and pharmacological activities of five species of *Bauhinia* genus: A review. Journal of Fitoterapia. 2024; 105830.
13. Sagar PK, Sajwan S, Mageswari *et al*. Scientific assessment, research studies of botanical, pharmacognostical, biodiversity and toxicological of ASU herbal drug Kaladana/ Habb-ul-Neel *(Ipomoea nil* (Linn.) Roth.) seeds. Journal of Pharmacognosy and Phytochemistry. 2024a; 13(5):112-123.DOI : http://doi.org/10.22271/phyto.2024.v13.i6b.15171
14. Sagar PK, Mangeswari S, *et al*. An conscious review validation biodiversity, pharmacognostical, pharmacological, toxicological research studies and therapeutic potential of ASU herbal drugs - seed part of Baphali / Duku / Duqu (*Peucedanum grande* C.B. Clarke). Journal of Pharmacognosy and Phytochemistry. 2024b;13(4): 396-404. Available from DOI : http://doi.org/10.22271/phyto.2024.v13.i4e.15030
15. Sagar PK, Khan AS, Sajwan S, Kashyap S, Ahmad R. An concise overview on standardization research of ASU-TAM herbal formulated and single drugs, products, International Journal of Applied Research. 2024c; 6(1): 86-95.
16. Sagar P K, Khan A S, Kashyap S.Useful medicinal plants having anti-cancerous and anti-tumorous medicinal potential of *Withania Somnifera* (L.) dunal, *Andrographis paniculata* (Burm.f.) wall and *Glycyrrhiza glabra* L. International Journal of Pharmaceutical Science and Research. 2023; 14(7): 3221-3230.
17. Shamala T,Bolakotti G, Prashanth M K. Phytochemistry and Pharmacognosy of *Bauhinia Purpurea* L. Orange Book Publication (ISBN:978-93-5621-365-4), Chhattisgarh India 2023:1-83.

Author's contributions:

Dr Pawan Kumar Sagar (Chemistry): Manuscript work designed, and Manuscript written and revised manuscript review. Dr.AS Khan and Dr. RP Meena, Dr, R Murugeswaran provide very helpful support and carried out bioactive phytochemical constituents, and ethno-pharmacological potential, biodiversity, geographical occurrence profiles development, re-confirmation and re-authentication investigated studies..

Declaration of Competing Interest:

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements:

The authors are grateful thanks to higher related senior authority Director General of CCRUM, Ministry of AYUSH, New Delhi, Scientific Researcher supporting staff's of the Central Council for Research in Unani Medicine, Ministry of AYUSH, Government of India and Drug Standardization Research Institute, PCIM&H Campus, IInd floor, Kamla Nehru Nagar, Ghaziabad UP.(NABL ISO-17025-2017,Accredited, certified), PCIM&H, Ghaziabad UP. India for provided all relevant cooperation, supports of required modern and scientific facilities to conduct this comprehensive review research work study.

Conflict of interest: The authors declared no conflict of interest.

Financial support statement: Nil.

Main Author ORCID ID: Dr. Pawan Kumar Sagar: 0009-0007-8695-9958

18. Wakchoure S. Jadhav S, Raut P, Tribhuvne B, Chaudhari B V. Review on Pharmacological Activity Of Bauhinia Purpurea L. Flower. International Journal of Noval Research and Development. 2023; 8(3): 518-527.
19. Chen V T, Tham M Vo, Phong T Bui, Duc N P Duong, Lam X N Duong, Diep Q. Dinh, Hien T T Nguyen. Phytochemical Screening, Antioxidant Activity and α-Glucosidase Inhibitability of *blakeana* Dunn Leaf and Flower Extracts from *Vietnam×Bauhinia*. Tropical Journal of Natural Product Research. 2023;7(4): 2737-2743.
20. Sharma K, Kumar V, Kumar S. Sharma R, Mehta CM. *Bauhinia variegata*: a comprehensive review on bioactive compounds, health benefits and utilization. Journal of Advances in Traditional Medicines. 2021;21:645-653.
21. Prabhu S, Vijayakumar S, Ramasubbu R, Praseetha P K, Karthikeyan K, Thiyagarajan G, Sureshkumar J, Prakash N. Traditional uses, phytochemistry and pharmacology of *Bauhinia racemosa* Lam.: a comprehensive review. Future Journal of Pharmaceutical Science. 2021;1:101.
22. Sagar P K, Sajwan S, Khan AS, Ahmed M W. Useful anti-cancerous & anti-tumorous, immuno-modubulator, medicinal potent asian medicinal plants (*Curcuma domestica* Valeton or *Curcuma longa* L., *Tinospora cordifolia* (Willd.) miers) & *Ocimum tanuiflorum* L.,*Ocimum sanctum* L.). International Journal of Multidisciplinary and Educational Research. 2021; 10,8(2): 69-79. DOI: https://www.researchgate.net/publication/372631355_Useful_AntiCancerous_Anti-Tumorous_ImmunoModubulator_Medicinal_Potent_Asian_Medicinal_Plants_Curcuma_Domestica_Valeton_Or_Curcuma_Longa_L_Tinospora_Cordifolia_Willd_Miers_Ocimum_Tanuiflorum_Locimum
23. Abdel-Halim AH, Fyiad AAA, Aboulthana WM, El-Sammad NM, Youssef AM, Ali MM. Assessment of the anti-diabetic effect of *Bauhinia variegata* gold nano-extract against streptozotocin induced diabetes mellitus in rats. J. Alied Pharm. Sci. 2020; 10(05):077–091
24. Shamran DJ, Al-Jumaili EFA, Tawfeeq AT. Cytotoxicity effect of glucokinin isolated from *Bauhinia variegata* against several cancer cell lines. Iraqi J. Biotechnol. 2020; 19(1):69-74.
25. Babu S, Jayaraman S. An update on β-sitosterol: A potential herbal nutraceutical for diabetic management. Biomed Pharmacother. 2020; 31:110702.
26. Arora S K, Hussain M, Subhash RY, Moharir K, Pande V, Ittadwar A. *Bauhinia purpurea*: An Updated Pharmacological Profile. Journal of Ayurvedic and Herbal Medicine. 2020;6(2):81-85.
27. Reddy AM, Suresh Babu MV, Rao RR. Ethnobotanical study of traditional herbal plants used by local people of Seshachalam Biosphere Reserve in Eastern Ghats, India. Her. Polonica. 2019; 65(1):40–45
28. Anonymous. "*Bauhinia variegata*". Germplasm Resources Information Network. Agricultural Research Service, United States Department of Agriculture. Retrieved 23 April 2019.
29. Anonymous. "*Bauhinia purpurea*". Germplasm Resources Information Network. Agricultural Research Service, United States Department of Agriculture. Retrieved 2 January 2018a.
30. Anonymous.*"Bauhinia acuminata"*. Germplasm Resources Information Network. Agricultural Research Service, United States Department of Agriculture. Retrieved 16 January 2018b.
31. Anonymous."*Bauhinia tomentosa*, PlantZAfrica.com". 2019. www.plantzafrica.com . Archived from the original on 2016-12-10. Retrieved 2019-07-20.
32. Golwala DK, Vaidya SK, Dholwani KK, Patel DS, Sahoo S. Antioxidant and antimutagenic (anticlastogenic) activity of alcoholic extract of *Bauhinia variegata* (Linn.) root. Eur. J. Med .Plants. 2020:32-39.
33. Sagar P K, Meena R P, Ahmad W A, Sajwan K. 2020. Useful AntiCancerous & Anti-tumorous Asian medicinal Plants (*Taxus baccata* L. or *Taxus baccata* Thunb., *Catharanthus roseus* (L.) G. Don, *Annona muricata* L.).International Journal of Traditional and Complementary Medicine. 2020; 5(22): 1-12. DOI:https://www.researchgate.net/publication/372252377_Useful_AntiCancerous_Anti-tumorous_Asian_medicinal_Plants_Taxus_baccata_L_or_Taxus_baccata_Thunb_Catharanthus_roseusL_GDon_Annona_muricata_L
34. Sebastian D, Sophy R. *Bauhinia acuminate* Linn: A brief review of its phytochemistry and pharmacology. Asian Journal of Pharmacy and Pharmacology. 2020; 6(3): 164-170.
35. Kumar A, Anand V, Dubey RC, Goel KK. Evaluation of antioxidant potential of alcoholic stem bark extracts of *Bauhinia variegata* Linn. J. Alied .Nat. Sci. 2019;11(1):235-239.
36. Singh N, Singh A, Pabla D. A review on medicinal uses of *Bauhinia variegata* Linn. Pharma Tutor. 2019;7(6):12–17.
37. Tripathi AK, Gupta PS, Singh SK. Antidiabetic, anti-hyperlipidemic and antioxidant activities of *Bauhinia variegata* flower extract. Biocatal Agric Biotechnol. 2019;19:101142
38. Burrows J E, Burrows S M, Lötter M C, Schmidt E. Trees and Shrubs Mozambique Publishing Print Matters (Pty), Cape Town. 2018;: 240.
39. Sebastian D. Pharmacognostic standardization and bioassay-guided fractionation of in *Bauhinia acuminata* relation to anti-lung cancer activity. University Madras.2018.
40. Padgaonkar AV, Suryavanshi SV, Londhe VY, Kulkarni YA. Acute toxicity study and anti-nociceptive activity of Linn leaf extracts in *Bauhinia acuminate* experimental animalmodels. Biomedicine and Pharmacotherapy. 2018;2(7):158-168.
41. Prabhu R, Razali N, Dhandapani N, Nagaraj P, Muthaiyan P, Joseph, JR. *In-Vitro* Anthelmintic Study of *Bauhinia acuminata* Linn. Leaf Extracts Against the. Indo Amercian Journal of Pharmaceutical Sciences. 2018; 05(06):5082–5089.
42. Alharbi NS, Govindarajan M, Kadaikunnan S, Khaled JM, Almanaa TN, Alyahya SA, Sudha A. Nanosilver crystals capped with Phytochemicals as *Bauhinia acuminata* new antimicrobials and mosquito larvicides. Journal of Trace Elements in Medicine and Biology. 2018; 50:146-153.
43. Kumar V, Rathore K, Jain P, Ahmed Z.Biological activity of *Bauhinia racemosa* against diabetes and interlinked disorders like obesity and hyperlipidemia. Clin. Phytosci. 2017; 3(1):7.
44. Shahana S, Nikalje APG. A brief review on *Bauhinia variegata*: phytochemistry, antidiabetic and antioxidant potential. Am. J. Pharmtech. Res. 2017; 7(1):186-197
45. Ayyappan P, Ganesan K, Jayakumararaj R. Ethnobotanic informations on uncommon anti-diabetic medicinal plants from Alagarkoil Forest reserve: evidence based strategic rationale in management of diabetics. Int. J. Pharma Pharmaceu. Res. 2016;16(4):515–526
46. Jaganathan GK, Thanh Hoa TH, Liu BL. Ethnobotanical survey of Irular tribes in Pillur valley, Coimbatore, Tamil Nadu (India). Int. J. Herb. Med. 2016; 4(1):1–11
47. Md AR, Akhtar J, Sahabjada AM. Evaluation of cytotoxic potential and apoptotic effect of a methanolic extract of *Bauhinia racemosa* Lam. against a human cancer cell line, HeLa. Eur J Integr Med. 2016; 8(4):513-518
48. Radha R, Vasantha VS, Pitchumani K. Chemical constituents from the flowering buds of *Bauhinia tomentosa* Linn (FBBT), Natural Product Research. 2016;13(4):1670-1674.
49. Liu M, Dong J, Lin Z Niu Y,Zhang X, Jiang H, Guo N, Li W, Wang H, Chen S. Rapid Screening Of Transferrin-Binders In The Flowers Of Bauhinia Blakeana Dunn By On-Line High-Performance Liquid Chromatography–Diode-Arraydetector–Electrospray Ionization–Ion-Trap–Time-Of-Flight–Mass Spectrometry–Transferrin–Fluorescence Detection System. Journal Of Chromatography A. 2016; 1450:17-28.
50. Dongray R, Chanchal D, Chaudhary S. Phytochemical and Pharmacological Properties of World *Bauhinia acuminata* Journal of Pharmaceutical Research. 2016; 05(01):531-546.
51. Gopalakrishnan S, Vadivel E. Identification of Chemical Compounds from the Ethanolic Extract of the Bark of *Bauhinia tomentosa* L. By GC-MS Analysis. International Journal of Pharmaceutical Sciences and Drug Research. 2016; 8(3): 149-152.
52. Chanchal D K, Niranjan P, Alok S, Singh, Saurabh S**.** An update on Ayurvedic herb Kachhnar *(Bauhinia purpurea* linn.)- A review. International Journal of Pharmacognosy. 2015; 2(8): 381-390. Chandra TR, Suresh C, Sanghamitra D, Kumar GR. Kanchnara (*Bauhinia variegata*linn): a critical review. Int J Ayurveda Pharm Res. 2015; 3(7):39-46.
53. Ramakrishna N, Reddy S, Sreelakshmi T, Sunitha EM, Saidulu CH, Rajani A.Ethnobotanical survey in common plants of medicinal usage in tribal communities of Naikpods and Parthan of different mandals of Adilabad district, Telungana State, India. Int J Innov Pharm Sci Res. 2015;3(10):1500–1512
54. Prusty KB, Venkateshwar Rao J, Subudhi SK, Anitha Reddy P, Raj Kumar J. Anti-hyperglycemic activity of extracts of leaves of *Bauhinia racemosa* Lamk (Family-Caesalpineaceae) on normal and aloxan-induced diabetic rats. Int J Pharm Res Allied Sci. 2014; 1(4):94-99
55. Khan MF, Shilpi RI, Rashid R, Rashid MA. In vitro antioxidant, cytotoxic and membrane stabilizing activities of Bangladesh *Bauhinia* acuminate L. Pharmaceutical Journal. 2014; 17(1): 99-101.
56. Islam M, Fahad M, Hossain M, Mamun M, Ferdous M. *In-vitro* Cytotoxic and thrombolytic activity of methanolic extract of Leaves. UK *Bauhinia acuminata* . Journal of Pharmaceutical and Biosciences. 2014; 2(2):4-6.

57. Reyad-Ul-Ferdous M, Liza F,Towshin Alam T, Tasnim F, Mukti M, Khan M E, Haque, T. Evaluation of potential antioxidant activity of leaves of *Bauhinia acuminata*. Iranian Journal of Pharmaceutical Sciences. 2014; 10: 55- 60
58. Sathya V, Bharathidasan R, Tamil Selvi S, Sophia Rebeccal N, llakkiya R, Prabakaran M. Quantitative, qualitative phytochemical analysis and in vitro antibacterial activity of *Bauhinia tomentosa* L. Journal of Natural Products and Plant Resources. 2013;3(2):31-36.
59. Khaled R, Meng-TL LTZ, Yong TZ. Anti-HIV-1 potential of *B. racemosa* Lam. (Caesalpiniaceae) and Phytochemical profile. Topclass J Herbal Med. 2013; 2:95–102.
60. Verma S, Mohanta T, Revathy T, Suthindhiran K, Jayasri M A. Phytochemical and Pharmacological Evaluation of Selected Plants. American Journal of Biochemistry and Biotechnology. 2013;9(3): 291-299.
61. Sagar P K. Emerging trends of selective medicinal plantsused in preparation of traditional Ayurvedic & Unani, patent formulated medicines, having effctive Anti-diabetic, Hypoglycaemic medicinal values - a review. International Journal of Natural Product Science. 2013;3(4):1-19. DOI. https://www.researchgate.net/publication/372251602_Emerging_Trends_Of_Selective_Medicinal_Plants_Used_In_Preparation_Of_Traditional_Ayurvedic_Unani_Patent_Formulated_Medicines_Having_Effctive_Anti-Diabetic_Hypoglycaemic_Medicinal_Values_-A_Review
62. Salihu SO, Osahon M, Jacob JO,Maji JE, *Bauhinia tomentosa* plant research. Journal of Biomedic. Sci. 2012, 6(2): 6-11.
63. Sharma S,Kumar A: Tribal uses of medicinal plants of Rajashthan: Kachnar. IJLSPR. 2012; 2(4): 69-76.
64. Kumar T, Alexander A, Dewangan D and Nagori K: Anthelmintic activity of the whole plant of *Bauhinia purpurea* (Linn.). Asian J Pharm Clin Res. 2011a; 4(3): 110- 111.
65. Kumar T, Chandrashekar KS: *Bauhinia purpurea* Linn.: A review of its ethnobotany, phytochemical and pharmacological profile. Res J Med Plant. 2011b; 5(4): 420- 431.
66. Palshetkar A, Pathare N, Jadhav N, Pawar M, Wadhwani A, Kulkarni S, Singh KK. In vitro anti-HIV activity of some Indian medicinal plant extracts. BMC Complement Med. Ther. 2010; 20(1):69. Dugasani S, Balijepalli M K, Tandra S, Pichika M R ."Antimicrobial activity of *Bauhinia tomentosa* and *Bauhinia vahlii* roots". Pharmacogn Mag. 2010; 6 (23): 204-207.
67. Kannan N, Renitta RE, Guruvayoorappan C. "*Bauhinia tomentosa* stimulates the immune system and scavenges free radical generation in vitro". Journal of Basic Clin Physiol Pharmacol. 2010; 21 (2): 157–68.
68. Rosy BA, H. Joseph and Rosalie, *Bauhinia tomentosa* plant research. Inter. Journal of Biologic. Techn. 2010, 1(1):12-15.
69. Pavithra P S, Janani V S, Charumathi K H, Indumathy R, Potala S, Verma R S. *Bauhinia tomentosa* plant research. Int. Journal of Green Pharma. 2010, 10: 22-28.
70. Brummitt R K, Chikuni AC, Lock JM, Polhill RM. Leguminosae Subfamily Caesalpinioideae. Journal of Flora Zambesiaca. 2007; 3(2):19 - 20.
71. Lau C P Y, Ramsden L, Saunders R M K. "Hybrid origin of "*Bauhinia blakeana*" (Leguminosae: Caesalpinioideae), inferred using morphological, reproductive, and molecular data", American Journal of Botany. 2005; 92 (3): 525–33,
72. Gupta M, Mazumder UK, Siva Kumar T, Gomathi P, Sambath Kumar R.Antioxidant and hepatoprotective effects of *Bauhinia racemosa* against paracetamol and carbon tetra-chloride induced liver damage in rats. Iran Journal of Pharmacol Ther. 2004; 3(1):12-20.
73. Mapaura A, Timberlake J. (eds) . A checklist of Zimbabwean vascular plants Southern African Botanical Diversity Network.2004; Report No. 33 Sabonet, Pretoria and Harare : 43.
74. Shanley P, Luz, L. *Bauhinia tomentosa* plant research. Journal of Bio. Sci., 2003, 53 (6): 573 - 584.Pal DC, Jain SK. Tribal medicine. Calcutta, India. 1998.
75. Kirtikar KR, Basu BP. Indian Medicinal Plants. International Book Publisher, Dehradun 1993.