AYUSHDHARA

ISSN: 2393-9583 (P)/ 2393-9591 (O)

An International Journal of Research in AYUSH and Allied Systems

Review Article

THE PHYTOCHEMICAL AND PHARMACOLOGICAL PROPERTIES OF *CORDIA DICHTOMA*: A REVIEW

Rajveer Sason[1]*, Anita Sharma[2]

*[1]PG Scholar, [2]Associate Professor, PG Department of Agada Tantra, National Institute of Ayurveda, Amer Road, Jaipur, India.

Article info

Article History:

Received: 25-06-2015

Accepted: 24-07-2015

KEYWORDS: *Cordia dichtoma,* Phytochemical activity, Pharmacological activity.

***Corresponding Author**
Dr. Rajveer Sason
PG. Scholar
Dept. of Agada Tantra evam Vyavhara Ayurveda
National Institute of Ayurveda, Jaipur, Rajasthan – 302002, India.
Email: sasonrajveer2@gmail.com
Mob. No. +919509116664

ABSTRACT

Sleshamatak (*Cordia dichtoma*) is a medicinal plant explained in *Ayurvedic* literature and in modern science too. *Cordia dichotoma* is a plant species in the genus *Cordia*. The genus *Cordia,* with about 300 identified species and worldwide distribution, is one of the largest genera in the family boraginaceae.

Cordia dichtoma commonly known as *Lasoda*, has number of therapeutic properties. *Cordia dichtoma* is also known as *Shleshmatak*, *Shelu*, Clammy Cherry, Indian Cherry, Sebesten. The plant contains cathartin, allantoin, β-sitosterol, palmitic acid, linoleic acids, pyrrolizidine alkaloids, coumarins, flavonoids, saponins, terpenes and sterols. In Ayurvedic texts *Lasoda* is considered as a *snehopaga* and single used drug for all types of Gastro-intestinal disorders thoroughly internal and external mode. *Cordia* has long been used in traditional medicine for cicatrizant, astringent, anti-inflammatory, anthelminthic, antimalarial, diuretic, febrifuge, appetite suppressant, cough suppressant and to treat urinary infections, lung diseases and leprosy. There are so many researches has been done on this plant like Anti-ulcer activity, Anti-diabetic, wound healing, contraceptive effect, Hepato-protective, Anti-microbial, Anti-inflammatory and Anthelmintic. This review represents brief information about botanical description, chemical constituents, and functional as well as medicinal uses of *Cordia dichtoma*. The plant also has number of pharmaceutical applications i.e. may be used as excipient in many of indigenous formulations. This review will definitely give the helpful information about this plant.

INTRODUCTION

Medicinal plants plays an important role in Indian culture since Rig Veda (5600 BC) where in 67 medicinal plants were recorded. Out of 250, 000 higher plants, more than 80, 000 plants have medicinal values and India occupies unique position among world's 12 biodiversity centers. The use of natural substances, particularly plants, to control diseases is a centuries old practice that has led to the discovery of more than half of all modern pharmaceuticals. A growing worldwide interest in the use of phyto-pharmaceutical as complimentary or alternative medicine either to prevent or ameliorate many diseases has been noted in recent years. [1]

Cordia is a genus of trees or shrubs, sometimes subscandent in the borage family Boraginaceae. The plant parts like fruits, leaves, stem bark, seeds and roots of most species of plants of the genus *Cordia*, has long been used in traditional medicine for cicatrizant, astringent, anti-inflammatory, anthelminthic, antimalarial, diuretic, febrifuge, appetite suppressant, cough suppressant and to treat urinary infections, lung diseases and leprosy.

Lisoda is a common medicinal plant in southern India and its botanical name is *Cordia dichotoma*.

Family: Boraginaceae

Vernacular name

Local Names: Lisoda

English names - Clammy Cherry, Indian Cherry and Sebesten Plum

Bengali - buhal, bahubara

Gujarati - vadgundo, gunda

Hindi - lasura, bhokar, borla

Javanese-kendal

Lao (Sino-Tibetan)-'man, 'man khôk

Nepali- *Kalo bohori*, *Bohori*

Thai - *Mandong*, *Manma*, *Phakmong*

Sanskrit - *Bahuvarka*, *Shleshmatak*, *Shelu*

Apart from Bhokar, the plant is also known as Chhota lasora and Gondi, Guslasah, Lasora and Rassala, in **Hindi.** The people speaking **Marathi** know the plant in the names of Bhokar, Chokri, Sherti, Shelu and Shelvant. While the **Tamil** speaking people name the plant as Kalvirusu, Naruvili, Vidi, Viriyan or Viruvu; It is named as Botuka, Chinna, Inki, Iriki, Nakheri and Nakkeru, in **Telugu.** [2]

Ancient literature

Vedic kala

It is described under the name "*Rajjudala*" in Vedas.[3]

Samhita kala

In "*Brihatrei*" *Sleshmatak* has been described at many places for its beneficial medicinal uses. *Acharya Charak* quoted it among "*Vishaghan dasamani*"[4]. *Susruth* mentioned it among "*Phal verg*" and also *Vish nivranaarth*". *Acharya Vaghabhat* indicated it as external application in "*Visarpa chikitsa*."

***Nighantu kala* [6-17]**

It is mentioned in almost all the *Nighantus*. Among the *Nighantus*, *Raaj Nighantu* has mentioned it under "*Amaradi varg*". *Madanpaal nighantu* has mentioned it under "*Vataadi varga*". *Dhanvantri nighantu* has mentioned it under "*Amaradi varg*". *Kaidav nighantu* has mentioned it under "*Aushadi varg*". *Bhavprakash nighantu* has mentioned it under "*Amaradi phal varga*". *Priya nighantu* has mentioned in "*Haritakyadi varga*".

Adhunik kala

Nighantu adarsh has placed it under "*Sleshmatakaadi varga*" explaining all its botanical, pharmacological and medicinal description.[5] Various other literary books like "*Dravya gun vigyan*" and "*Van aushdhi nirdeshika*", "*Draya gun hastamalak*" has also described its anti-toxic and anti-helminthic property along with its *Raspanchak* description. In Modern botanical texts it is being identified as *Cordia dichtoma*.

Ayurvedic review

***Raspanchak Guna-dharma* (Pharmacognostical properties)**

Table 1: Showing *Guna-dharma* of *Sleshmatak* as mentioned in Ayurvedic literature and *Nighantus* [6-17]

Samhita* and *Nighantu	***Rasa***	***Guna***	***Virya***	***Vipaka***	***Dhoshganta***
Charak Samhit[6]	*Madhur*	*Guru*	*Sheet*	-	
Bhavprakash[7]	*Madhur, Tikt*	*Guru, Snigdh*	*Sheet*		*Kaphpitahar*
Bhavprakash nighantu[8]	*Madhur, Tikt*	-	*Sheet*	*Madhur*	-
Kaidav nighantu[9]	*Madhur, Kashaya, Katu, Tikta*	-	*Ushna*	*Madhur*	*Pita kaph shamak*
Dhanvantri nighantu[10]	*Madhur*	*Ruksh, Pichil*	*Sheet*	-	-
Shankar nighantu[11]	*Katu, Madhur, Kashaya*	*Snigdh*	*Sheet*	-	*Pita shamak, Vishghan*
Raaj nighantu[12]	*Katu, Madhur, Kashaya*	-	*Sheet*	-	*Aamraktvikar Shamak, Kaphkar*
Madanpaaal nighantu[13]	*Madhur, Kashaya*	*Guru, Snigdh, Pichil*	*Sheet*	*Madhur*	*Kaphpitahar*
Nighantu adarsh[14]	*Madhur, Kashaya, Tikta*	-	*Sheet*	*Katu, Madhur*	*Kaphpitahar*
Dravya gun hastamalak[15]	*Madhur*	*Snigdh, Guru*	*Sheet*	*Madhur*	*Vatapitashamak*
Dravyagunvigyan[16]	*Madhur, Kashaya*	*Guru, Snigdh, Pichil*	*Sheet*	*Madhur*	*Kaphpitahar, Vishghan*
Priya nighantu[17]	*Madur*	*Snigdh*	*Sheet*		*Kaphrakthar*

1) *Gunkarma* of *Apakav Sleshmatak phal*

Rasa - *Madhur, tikta*
Gun - *Ruksh*
Veerya - *Sheet*
Vipaka - *Katu*
Doshagnata - *Kaphraktvikar shamak*

2) *Gunkarma* of *pakav Sleshmatak phal*

Rasa - *Madhur*
Gun - *Snigdh*
Veerya - *Sheet*
Vipaka - *Katu*
Doshagnata - *Vata pita shamak, Kaphvardhak*

Part used- *Tavak, Patra, Phal, Phalmajja*

Dosage- bark decoction 50-100ml

Fruit syrup- 10-20 ml

Formulations- *Sarbat lasoda, Joshanda*

Indications of *Sleshmatak* as per *Ayurvedic* literature

1. *Charak* has mentioned it under "*Vishghan Mahakashaya*" and in "*Kaphaj visarpa*" *Lep* of *Twacha* of *Sleshmatak* is mentioned.[18]

2. *Susruth* has mentioned use of its *Twak* in every *Vishvikaar* and also in *Raktpitta*.[19]

3. *Vaghbhatt* –In *Visarpa chikitsa*.

4. *Chakardatt* – Mentioned it as "*Keshyakrisnikarn*".

5. *Bhavprakash*- In "*Masurika chikitsa*".

6. *Vangsen* – In *Visphot chikitsa* as *Pralep*.

7. *Rajmatarand*- In *Chechak*, leaves of *Sleshmatak* are used.[20]

Table-2 Indications are as follows [6-17][18-20]

Indications	K.N	N.A	S.N	B.N	R.N	M.N	*Dravya gun hastamalak*	*Dravya gun vigyan*
Vishaghan	+	+	+	-	-	+	+	-
Kushtghan	+	+	+	-	-	+	+	+
Krimighan	+	+	+	-	+	+	+	-
Visarpa	+	+	+	-	-	+	+	+
Varna	+	+	+	-	+	+	+	+
Kusth	-	+	+	-	-	+	-	-
Shool	-	-	-	-	+	+	-	-
Aamvikar	-	-	-	-	+	+	-	-
Malaavrodh	-	-	-	-	+	+	+	-
Visphoot	+	+	+	-	+	+	-	-
Keshya	-	+	+	-	-	+	-	-
Mutrakrish	-	-	-	-	-	+	+	-
Masurika	-	+	-	+	-	+	-	+

K.N- *Kaidav nighantu,* **N.A-** *Nighantu adarsh,* **S.N-** *Shankar nighantu,*
B.N- *Bhavprakash nighantu,* **R.N-** *Raaj nighantu,* **M.N-** *Madanpaaal nighantu*

Biological Classification[21]

Kingdom	:	Plantae
Division	:	Magnoliophyta
Class	:	Dicotyledons
Subclass	:	Asteridae
Order	:	Lamiales
Family	:	Boraginaceae
Genus	:	Cordia L. – cordial
Species	:	*Cordia dichotoma* G. Forst.
Fragrant	:	Manjack
Common name	:	Bhokar, Shleshmantaka

Botanical description

Cordia dichotoma, small to moderate-sized 5 to 10 meters deciduous tree with a short bole, short crooked trunk and spreading crown. The stem bark is grayish brown smooth or longitudinally wrinkled.

Leaves are simple, 6 to 10 cm long entire and slightly dentate, elliptical-lanceolate to broad ovate with a round and cordate base[22].

Flowers are stalk less, white or yellowish-white, about 7 mm long and borne in lax inflorescences 5 to 10 cm long[23]. These flowers are followed by 1 in (25mm) long dull pinkish edible fruits with sticky flesh flowers are short stalked, bisexual and white in colour, appear in loose corymbose cymes. The calyx is ovoid. The corolla tube no longer than the calyx with spreading and relaxed lobes. Throat of the corolla and stamens are hairy.

The fruit is a yellow or pinkish-yellow shining globose or ovoid drupe seated in a saucer-like enlarged calyx. It turns black on ripening and the pulp gets viscid. The hard stone is 1-4 seeded.[24]

Flowering takes place from March to May with the new leaves. The old leaves are shed during winter and the trees are leafless for a short period in early summer. Fruits are formed soon after flowering, develop quickly and ripen from June to August in north India and normally before May in south India. Seed dispersal is aided by birds and monkeys which feed on the ripe fruit.[25]

Odour: Characteristic.

Taste: Sweet

Chemical constituents [26]

Alkaloids, glycosides, proteins, amino acids, carbohydrates, triterpenoids, tannins, flavonoids, saponins, phenols and steroids, Arabinoglucan, pyrrolizidine alkaloids, coumarins, fats, Gum.

Fatty acids: palmitic acid, stearic acid, arachidic acid, behenic acid, oleic acid and linoleic acid.

Flavonoid glycosides: robinin, rutin (rutoside), datiscoside and hesperidin, Flavonoid aglycone: -dihydrorobinetin).

Phenolic derivatives: chlorogenic acid and caffeic acid

Sugar: D-glucose, L-Arabinose

Bark contains a large amount of tannic acid. Bark contains a principle similar to "cathartin." allantoin, β-sitosterol and 3′, 5-dihydroxy-4′′-methoxy flavanone-7-O-alpha-L-rhamnopyranoside.

Leaves also contain quercetin and quercitrin.

Fruit yields saponins, amino acids, flavonoids, sugar, gum, proteins, palmitic, stearic, linoleic acids, oleic, arachidic, behenic acids.

Fruits and leaves showed presence of pyrrolizidine alkaloids, coumarins, flavonoids, saponins, terpenes and sterols. The significant anti-inflammatory activity

of seeds is because of α-amyrins and taxifolin-3-5-dirhamnoside (71.4%, 67.8% respectively.

Functional Uses: [27-30]

1. Food

The immature fruits are pickled and are also used as a vegetable Fodder: The leaves yield good fodder and are lopped for this purpose. The seed kernel of *C. dichotoma* contains a high proportion of fatty oils and proteins (46 and 31%, respectively) which has potential as cattle feed.

2. Fuel: The tree is used as a fuel wood. Timber: The wood is used to make agricultural implements.

3. Insecticide: Fruit extract of *C. dichotoma* suppresses larval hatching of Meloidogyne incognita.

4. Pharmaceutical uses: The medicinal attributes of *C.dichotoma* have been known since a long time. Seeds of the species are anti-inflammatory, two compounds alpha-amyrin and 5-dirhamnoside have been isolated. The bark is medicinal and several chemicals have been identified; Allantoin, beta -sitosterol and 3', 5-dihydroxy-4'-methoxy flavanone-7-O- alpha -L-rhamnopyranoside isolated from it. The seed kernel has also many medicinal properties.

5. Services Boundary or barrier or support: *C. dichotoma* is a quick-growing fruit tree, performing well under semi-arid conditions and suitable for planting along boundary and farm roads.

6. Corrosion Inhibitor Study investigated the corrosion inhibition of mild steel using *C. dichotoma* extracts. Results showed the alcoholic extracts to be a better corrosion inhibitor than toxic chemical.

7. Medicinal uses

Antiulcer, wound healing, anti-inflammatory, analgesic, antidiabetic, antimicrobial, anti aging, hepatoprotective, anthelmintic (chloroform extract), laxative (fresh fruit), gonorrhea, expectorant.

In *Ayurveda*, leaves and stem bark used for dyspepsia, fever, diarrhea and leprosy. The bark is moistened an applied to boils and tumors to hasten ripening. Also used for headaches and stomachaches. Bark is used as antidyspeptic and as febrifuge. Powdered bark used for mouth ulcers. Infusion of bark used as gargle. The bark juice, mixed with coconut milk, is used to relieve colicky pains. In Java and Bengal, the bark is used as a tonic. In Java, the bark is used for dysentery; and with pomegranate rind, used for fevers. The bark is rubbed on the teeth to strengthen them. Leaves used for ulcers and headaches. The highly mucilaginous fruit is used for coughs and ailments of the chest, uterus and urethra. In large quantities it may use as a laxative. In India, it is traditionally used for ulcerative colitis, ulcers, and colic pain. In Bengal, fresh fruit is used as laxative and pectoral. In Java, its fruit is used for gonorrhea. In Punjab and Kashmir, its dried fruit are used as expectorant.

8. Other uses: - In the Philippines, rope is made from the bast. - From the fruit, the white gelatinous substance is used as glue. - Fish are cooked wrapped in leaves. - In Burma, the leaves substitute for cigar wrappers.

Pharmaceutical industrial uses- the following applications of *Cordia dichotoma* gum in pharmaceuticals.

a) Tablet binder

The fruit of *cordia dichotoma* is highly sticky in nature this property is used for binding of tablets. In future *Cordia* gum could compete favorably with gelatin as binder in tablet formulations.

b)Emulsifier

The *Cordia* gum as pharmaceutical excipient, may used as an emulsifier. The *Cordia* gum will be a good option as bio-degradable, cheap, economic and easily available emulsifier in the list of pharmaceutical excipient.[31-32]

Researches and Pharmacological Properties

Acute toxicity study: This study was designed to elucidate the toxicity of the widely used plant

Cordia dichotoma in rats (Lorke D., 1983), the methanolic, chloroform, aqueous extracts isolated from the leaves of *Cordia dichotoma* and studied their toxic effects. Acute toxicity and LD50 values were determined in experimental rats.

There were no remarkable changes noticed in the histopathological studies after 50 mg/kg body wt of the extracts of *Cordia dichotoma* when administered intraperitoneally for 14 days successively. Pathologically, neither gross abnormalities nor histopathological changes were observed. After calculation of LD50 values using graphical methods, we found a broad therapeutic window and a high therapeutic index value for *Cordia dichotoma* extracts. Collectively, these data demonstrate that the extracts of the leaves of *Cordia dichotoma* have a high margin of drug safety.[33]

Antiulcer activity

The fruits extract of *Cordia dichotoma* Forst shows antiulcer activity. Extractions of *Cordia dichotoma* fruits were carried out using ethanol. It decreases the volume of gastric secretion, free acidity, total acidity and ulcer index with respect to control.[34]

Hepatoprotective activity

Methanolic extract of *Cordia dichotoma* shows hepatoprotective action in male Wistar rats with carbon tetrachloride induced heart damage. Plant extract has phenolic content and anti- oxidant activity.[35]

Wound Healing activity

Study of ethanolic fruit extract of *C dichotoma* showed significant wound healing activity. The fruits

contain large quantities of amino acid, flavonoids, and saponins and are used as wound healing agent in households.[36]

Anti-Inflammatory activity

The ethanol extract and aqueous fraction of *C. dichotoma* possess acute anti-inflammatory activity. The effects of *Cordia dichotoma* Forest Seed extracts on different phases of acute inflammation were examined. The dry powdered seeds were found to contain alkaloids, glycosides, saponins, tannins and carbohydrates. Thus it is found that ethanol extract and aqueous fraction of this plant possesses acute anti-inflammatory activity.[37]

Degenerative disorders

Role of *Cordia dichotoma* seeds and leaves extract in degenerative disorders. A common theme which underlies etiology of several degenerative disorders is free radical induced stress. free radicals prime the immunomodulatory response, recruit inflammatory cells and are innately bactericidal. in the body, excess production of free radicals affect lipid cell membranes to produce lipid peroxides and reactive oxygen species (ROS), Which leads to decline in membrane fluidity and many biological changes, such as DNA damage, ageing, heart disease and cancer etc. Antioxidants serve as free radical scavengers neutralizing and defending the body from a number of diseases which are born because of generation of free radicals. They offer defense against radical toxicity by antagonizing the damages caused by free radicals. Thus, Methanolic extract of seeds and leaves of *Cordia dichotoma* has useful in degenerative disorders.[37]

Antidiabetic activity

Anti hyperglycemic effects of *Cordia dichotoma* Forst in the glucose induced hyperglycemia. The fruit pulp of the *C. dichotoma* was screened for antidiabetic activity on the healthy male Wistar albino rats. Alloxan induced diabetic studies were randomly assigned into four groups each having six rats. Significant reduction in blood glucose level and the rate of body weight loss was observed in glucose loaded rats and alloxan induced diabetic rats when treated with methanol extract of fruits pulp, which reveals antidiabetic potential of fruits pulp of *C. dichotoma* and this can be useful for the management of diabetes mellitus.[38]

Antimicrobial activity

Extract of *Cordia dichotoma* also shows moderate activity against bacterial, fungal and yeast species. Water extracts of the *Cordia dichotoma* plants did not show any antimicrobial activity against all the tested microorganisms.[39]

Reversible Contraceptive Potential

Study evaluated the ethno-contraceptive use of *C. dichotoma* leaves (LCD) in post-coital albino rats. (2-hydroxypropyl)-β-cyclodextrin (BCD) was used as bioavailability enhancer to form LCD-BCD complex, Leaves extract showed 100% anti-implantation activity. LCD-BCD complex exhibited 100% pregnancy interception and showed strong estrogenic potential with a luteal phase defect. Histological and biochemical estimations showed reversible contraceptive potential after withdrawal.[40]

Anti-implantation: Antiimplantation activity of methanolic extract of *C. dichotoma* bark was evaluated by observing implantation site at various doses. The coarse powder material was defatted using petroleum ether (60-80) and extracted with methanol. The vaginal smear of the Wistar rats (200-250 g) was studied microscopically for estrus cycle and only female rats with normal estrus cycle were selected for study.

The implant number and size was examined on Days 10 and21 by laparotomy. There was no change in ovulation; hence the anti-implantation activity observed which can be attributed largely to its inhibition of number of implants.[41]

Anthelmintic: Study evaluated the anthelmintic activity of ethanolic and aqueous extracts of C. *dichotoma* on *Eudrilus euginieae* earthworms. Both extracts showed concentration dependent paralysis and death of worms, with the aqueous extract showing more significant activity.[42]

Effects on Long-term Hypoperfusion/Potential Benefit for Cerebrovascular Insufficiency: Study evaluated the effect of *C. dichotoma* on long-term cerebral hypoperfusion in rats. Long-term hypoperfusion caused a tendency for anxiety, listlessness, and depression, with histo-pathological changes in the forebrain. Treatment with *C. dichotoma* alleviated the behavioral, cognitive and histopathological changes, and suggests a benefit for treatment of cerebro-vascular insufficiency.[43]

DISCUSSION

As we seen above that *Sleshamatak* have many properties like, cicatrizant, astringent, anti-inflammatory, anthelminthic, antimalarial, diuretic, febrifuge, appetite suppressant, cough suppressant and to treat urinary infections, lung diseases and leprosy. These all properties have close resemblance with therapeutic properties explained in old text. All this discussion shows that, the old sages have very good knowledge about its pharmacological properties.

CONCLUSION

The use of natural substances, particularly plants, to control diseases is a centuries old practice that has led to the discovery of more than half of all modern pharmaceuticals. Various texts in literature and researches, studies in modern science describes the useful properties of *Cordia dichtoma* as anthelminthic, antimalarial, diuretic etc which shows usefulness and importance of this plant.

However, only a few works has been done on this plant and there is a large scope of investigation for

researchers to explore its potential in the field of medicinal research and pharmaceutical sciences.

REFERENCES

1. Phytopharmacological Properties of *Cordia Dichotoma* As A Potential Medicinal Tree: AN OVERVIEW, International journal of institutional pharmacy and life sciences, Anjana K. Patel, Nimish Pathak, Hardik Trivedi, Mahendra Gavania, Mihir Patel, Nitin Panchal C.U.Shah College of Pharmacy & Research, Wadhwan.
2. http://www.indianetzone.com/38/indian_cherry_bahuvaraka_plants.htm. [cited 2005 June 8].
3. https://books.google.co.in/books CF Eggeling Sacred Books of East 44/373 (2).
4. Dr. Brahmanand Tripathi Charak samhita Sutra sthan4/16Chaukambha Bharati Academy, Varanasi 5th edition 1997.
5. Vaidya Bapalal Nighantu adarsh Vol 2 Chaukambha Bharati Academy, Varansi Sleshmadi varg Chapter 77
6. Dr. Brahmanand Tripathi. Charak samhita Chaukambha Bharati Academy, Varanasi Sutra sthan5th edition 1997 27/152.
7. Shri Bhavamishra, Bhavaprakash, Purav khand Chaukambha Bharati Academy, Varanasi, edition-10, 1995page 627 shlok 105-107.
8. Sri Bhavmishra, Bhavprakash nighantu Chaukambha Bharati Academy, Varanasi, edition-10, 1995 page 571 shlok 105.
9. Sharma P.V. Kaidav nighantu, chaukahmbha bharati academy, Varanasi, edition- 1998 page 112 shlok 612-616.
10. Sharma P.V, Dhanvantri Nighantu, chaukahmbha orientalia, Varanasi, first edition, 1982.
11. Shankar Datt Gaur 'Shankar nighantu' chaukahmbha orientalia, Varanasi, edition ist 2002 page 247.
12. Shri Narhari pandit, Raja Nighantu, Hindi commentary by Inderdev tripathi, Krishana das academy, Varanasi, First edition, 1982 page 164 shlok 85.
13. Gyannedra Pandey Madanpal nighantu, chaukahmbha, orientalia, Varansi edition 5th 2012 page 413 shlok 22.
14. Vaidya Bapalal Nighantu adarsh Vol 2 Chaukambha Bharati Academy, Varanasi Reprint year 2007 Sleshmadi varg Chapter 77.
15. Mishra Banvarilal, Dravyaguna hastamalaka, sharan book dipo, Jaipur page 411.
16. Sharma P.V., Dravya guna vigyana, Vol-ii, chaukahmbha bharati academy, Varanasi, edition-1998 dwitya adhaya page 135-137.
17. Sharma P.V., Sharma guruprasad, Priya nighantu chaukahmbha orientalia reprint year 1998 page 53.
18. Dr. Brahmanand Tripathi.Charak samhita Chaukambha Bharati Academy, Varansi 5th edition 1997 Sutra sthan4/16'and chikitsa 11/91.
19. Dr. Ambika datt shastri Sushruth Samhita uttar tantra adhaya 45/16 Chaukambha Sanskrit sansthan Varanasi edition reprint 2012.
20. Vaidya Bapalal Nighantu adarsh Vol 2 Chaukambha Bharati Academy, Varanasi Reprint year 2007 Sleshmadi varg Chapter 77.
21. Nazim Hussain, Kakoti BB. Review on ethnobotany and phytopharmacology of *cordia dichotoma,* J Drug Deli & Ther 2013; 3(1): 110-113.
22. Sharma A, Bhardwaj S, Mann AS, Jain A, Kharya MD. Screening Methods of Antioxidant Activity: An Overview, Phcog 2007; 2: 232-238.
23. Burkill, H.M., 1985. The useful plants of West Tropical Africa. 2nd Edition. Volume 1, Families A–D. Royal Botanic Gardens, Kew, Richmond, United Kingdom. 960.
24. Anurag Mishra, Ganesh Prasad Garg. Antidiabetic activity of fruit pulp of *cordia dichotoma* in alloxan induced diabetic rats. Int J Pharm Sci Res 2011; 2(9): 2314-2319.
25. Patolia MB and Singh SP. 1993. Effect of pinching, repotting and growth regulators on budding success under different time of budding in sebesten (*Cordia dichotoma* Forst.).
26. International Journal of Pharmaceutical & Biological Archives 2014; 5(3): 41 – 47.
27. Kapoor LD. Handbook of Ayurvedic medicinal plants, 1st ed. Washington: CRC Press; 1994. p. 180.
28. Rajesh MG, Paul B, Latha MS. Efficacy of Kamilari in alcoholic liver cirrhosis, Antiseptic, 2000; 7: 320.
29. Rapisarda A, Ficarra R, Tommasin S, Caldbro ML and Hungsa S. Cordia francisci, C. martinicensis, C. myxa, C. serratifolia and Culmfolia leaves as new source of routine; Analgesic and anti-inflammatory activity. Planta Medica 1992; 42: 643.
30. Singh R, Lawnia RD, Mishra A, Gupta R. Role of *Cordia dichotoma* seeds and leaves extract in degenerative disorders. Int J Pharma Sci Rev Res 2010; 2(1): 21-24.
31. Nazim Hussain, Kakoti BB. Review on ethnobotany and phytopharmacology of *cordia dichotoma,* J Drug Deli & Ther 2013; 3(1): 110-113.

32. Yoganarsimhan SN. Medicinal plants of India, Banglore: Interline publishing Pvt. Ltd. 2000; 138-140.
33. Lorke D. A new approach to practical acute toxicity testing. Arch Toxicology 1983; 54:275-287.
34. Wassel G, El-Menshaw B, Saud A, Meharuna G and El-Merzabani M. Screening of selected plant for Pyrrolizidine alkaloids and antitumor activity. Pharmazine 1987; 42:709.
35. Thirupathi K, Sathesh Kumar S, Govardhan P, Ravikumar B, Krishna D, Krishna G Mohan/Nigerian, Hepatoprotective action of *Cordia dichotoma* against carbon Tetrachloride induced heart injury in Rats. Journal of Natural Products and Medicine 2007; 11.
36. Day C. Traditional plants treatments for diabetes mellitus: Pharmaceutical Foods., Brit. J. Nutr 1998; 80: 5-6.
37. Anjana K Patel, Nimish pathak, Hardik Trivedi, Mahendra G, Mihir P, Nitin P. Phytopharmacological properties of *Cordia dichotoma* as a Potential Medicinal Tree: an overview. Int. J. of Institutional Pharmacy and Life Sciences 2011;1(1).
38. Mishra A, Garg GP. Antidiabetic activity of fruit pulp of *Cordia dichotoma* in alloxan induced diabetic rats. Int J Pharm Sci Res. 2011;2(9):2314–2319.
39. Kuppasta IJ & Nayak PV. Anthelmintic activity of fruits of *Cordia dichotoma*. Ind J Nat Prod 2003; 19(3): 27-29.
40. Plaban Bhattacharya, Achintya Saha. Evaluation of reversible contraceptive potential of Cordia dichotoma leaves extract. Rev. bras. Farmacogn 2013; 23(2).
41. Katolkar PP, Wanjari BE, Nimbekar TP, Duragkar NJ. Anti-implantation activity of the methanolic extract of *Cordia dichotoma* Lam. bark in rats. Int J Biomed Adv Res. 2012;3(3):202–204.
42. Maisale AB, Attimarad SL. Anthelmintic Activity of Fruit Pulp of Cordia dichotoma. Int Journal Res App Pharm 2010; 1 (2): 597-600.
43. Anjana K. Patel. Role of cordia dichotoma on behavioral changes by using long term hypoperfusion in rats. International Journal of Pharmaceutical Research and Development 2011; 3(3).

Cite this article as:
Rajveer Sason, Anita Sharma. The Phytochemical and Pharmacological Properties of Cordia Dichtoma: A Review. AYUSHDHARA, 2015;2(3):155-161.

Source of support: Nil, Conflict of interest: None Declared