**INTRODUCTION**

Medicinal plants have been used since ages in traditional medicines due to their therapeutic potential and the search in medicinal plants have led to the discovery of novel drug candidates used against various diseases. *Cuscuta reflexa* is commonly called as dodder plant, and also known as devil’s hair, witch’s hair, love vine, amarbel or akashabela etc. *Cuscuta reflexa* is a parasitic weed plant and also an extensive climber. It grows as homoparasite. *Cuscuta reflexa* is rootless, leafless, perennial parasitic twining herb of Convolvulaceae family, commonly known as amarbel or dodder. It has no chlorophyll and cannot make its own food by photosynthesis. Dodder plant has the ability not only to recognize its host plant but also to move towards its prey with significant precision and efficiency. Dodder plant can also choose an appropriate host between many plants on the basis of volatile compounds release by the host plant as their normal process of transpiration. It spread from one host plant to another, and on each victim, they twin and cling tightly with special branching organs called haustorium. Haustorium penetrates the host and connect to the host xylem as well as to the host phloem and absorb from it both water and elaborated food stuff such as sugar and amino acids. It is believed that the parasitic herbs extract healthy and potential sap from the host plant and if their host plants are medicinal plants then these parasitic herbs show many similar properties to host plants. *Cuscuta* species feeding on commonly used medicinal herbs are given special attention by traditional healers. It lives its entire life without attachment to the ground and grows with the help of seeds which are minute and produced in large quantities. Seeds have a large coating and survive in the soil for 5-10 years.

Stems very long, rather stout, closely twining, branched, glabrous, pale greenish yellow, sometimes dotted with red. Flowers solitary or in umbellate clusters of 2-4 or in short racemes; pedicels short, glabrous, usually curved (rarely 0); bracts 1.5 mm. long, ovate-oblong, obuse fleshy. Calyx divided almost to the base; lobes 3 mm. long, slightly unequal, broadly ovate, obuse, glabrous and fleshy. Corolla white; tube 6-8 by 4 mm., almost cylindrical; lobes 2.5-3 mm. long, deltoid, acute, reflexed; scales almost at the base of the corolla –tube, large, oblong, subquadrate or somewhat obovate, fimbriate and incurved at the apex. Stamens in the throat of the corolla- tube; filaments scarcely any; anthers about ½ - exerted beyond the top of the corolla-tube. Ovary ovoid; style simple, very short and thick; stigmas 2, distinct, large thick and fleshy, 1.5 mm. long, ovoid. Capsules 6-8 mm. diam., depressed-globose, glabrous, circumscissile near the base. Seeds 2-4, large, black, glabrous.*Cuscuta reflexa* is investigated for Antihypertensive, Antidiabetic, Antioxidant, Hair growth promoting, Antimicrobial, Spasmolytic, Antitumor, Anti-arthritis, Nephroprotective, Antiviral, Anti-inflammatory, Antipyretic effect of *Cuscuta reflexa*. More researches should be done in this plant to explore its mode of action and uses.

**Keywords:** *Cuscuta*, Amarbel, Ayurveda, Ethnomedicine.

**ABSTRACT**

*Cuscuta reflexa* is a parasitic plant which belongs to family Convolvulaceae. It is commonly known as dodder plant, amarbel, akashabela. Traditionally it is called miracle plant. It is rootless, perennial, leafless climbing parasitic twining herb which takes food from host plant with help of special organ called haustorium. This review article will collect the detailed description of synonyms, vernacular name, habitat, botanical description, ethno-medicinal uses, properties, chemical constituents, pharmacological uses of *Cuscuta reflexa* from different classical Ayurvedic literature as well as modern research journals. This review article deals with Antihypertensive, Antidiabetic, Antioxidant, Hair growth promoting, Antimicrobial, Spasmolytic, Antitumor, Anti-arthritis, Nephroprotective, Antiviral, Anti-inflammatory, Antipyretic effect of *Cuscuta reflexa*. More researches should be done in this plant to explore its mode of action and uses.

**Keywords:**

- Antihypertensive
- Antidiabetic
- Antioxidant
- Hair growth promoting
- Antimicrobial
- Spasmolytic
- Antitumor
- Anti-arthritis
- Nephroprotective
- Antiviral
- Anti-inflammatory
- Antipyretic effect

**IN AYURVEDIC LITERATURE**

*Cuscuta reflexa* has no any reference in Vedic and Samhita Kala. It is mentioned in following Nighantus

**Bhavprakash Nighantu**

In BhavprakashNighantu synonyms akashavalli, amarvallari, kavali described. It is It is tkita (bitter) and kasaya (astringent), malasangrhahak (stool binder), pichchhil (sticky), netaroganashak (eye disorders), jathragnivardhak (appetizer), kashaya (astringent) and aamnashak(undigested food).

**Raj Nighantu**

The synonyms akashvalli, kavali, asprsha, vyomvallika are mentioned. The synonym of Akash(Sky) co joint with valli (climber) word makes the synonym “akashavalli”. Akashvalli...
has madhurrasa (sweet taste). It is pittashamak (cholagogue), rasayanar (rejuvenator), balavardhak (strength body) and has the properties of divyaausadhis (Divine power).\(^7\)

**Nighthantu Adarsh**

The plant is distributed with the name of aakashbel and amarbel. It is found on some trees as parasite and mentioned under karpurtwakadivarga. It is balya (strength body), keshya (hair strengthening), vranropan (wound healer) and vrishya (stomach strengthening). It is a rootless climber so it is called as Aakashbel.\(^8\)

**Shankar Nighthantu**

The synonyms are akesavalli, amarbel, aakashbel and aaloklata. Its taste is bitter, yellow colored with white flower. The dose is 1 to 12 masa. The properties are pichchhil (sticky), netrarognashak (eye disorders), jathragini vardhak (appetizer) and hridya (cardiotonic). It spreads over Ber and Aadu trees. It is a rootless climber so it is called as Aakashbel.\(^9\)

**Madanpal Nighthantu**

It is mentioned under Abhyaavadivarga. Synonyms are akesavalli, amarvallari and amarbel. It has grahini (astringent), tikshna (penetrating), and pichchhil (sticky)- rog rashakproperty.\(^10\)

**BOTANICAL CLASSIFICATION OF CUSCUTA REFLEXA**

Kingdom ............. Plantae
Subkingdom ............ Tracheobionta
Superdivision ........... Spermatophyta
Division ............... Angiospermes
Class .................. Eudicots
Subclass ............. Asterids
Order .................. Solanales
Family ............. Cuscutaceae
Alternate ............. Convolvulaceae
Genus ................... Cuscuta
Species ............... reflexa\(^11\)

**SYNONYMS**

akashavalli, amarvallari, khavalli, asprsha, vyomvalika, aakashbel, amarbel, aaloklata.

**VERNACULAR NAMES**

Hindi - Ambarel
Bengali - Swarnlata
Malyali - Nirmuli
Gujrati - Akashel
Telugu - Nulutega
Tamil - Erumakkottan
Persian - Afirmon
Assamese - Akakhilata
English - Dodder\(^12\)

**HABITAT**

This parasitic plant climbs over the trees and shrubs. *Cuscuta* is found in the temperate and tropical regions of the world with huge species diversity in tropical and subtropical regions. It is found throughout about 6 species are found abundant in Bengal plains.\(^13\) It is usually found in India and Ceylon up to an altitude of 2348 m. It is also found in Afghanistan, Malaysia, Nepal and Thailand. It grows on thorny, non thorny and other shrubs, sometimes completely covering bushes and trees. *Cuscuta reflexa* spread from one host to another, and on special branching organs called houstoria.\(^14\)

**BOTANICAL DESCRIPTION**

*Cuscuta reflexa* is a parasitic climber slender stem and branches.\(^15\) Stems very long, rather stout, closely twining, branched, glabrous, pale greenish yellow, sometimes dotted with red. Flowers solitary or in umbellate clusters of 2-4 or in short racemes; pedicels short, glabrous, usually curved (rarely 0), bracts 1.5 mm. long, ovate-oblong, obtuse fleshy. Calyx divided almost to the base, lobes 3 mm. long, slightly unequal, broadly ovate, obtuse, glabrous and fleshy. Corolla white; tube 6-8 by 4 mm., almost cylindrical; lobes 2.5-3 mm. long, deltoid, acute, reflexed; scales almost at the base of the corolla – tube, large, oblong, subquadrate or somewhat obovate, fimbriate and incurved at the apex. Stamens in the throat of the corolla- tube; filaments scarcely any; anthers about ½ –exserted beyond the top of the corolla-tube. Ovary ovoid; style simple, very short and thick; stigmas 2, distinct, large thick and fleshy. 1.5 mm. long, ovoid. Capsules 6-8 mm. diam., depressed-globose, glabrous, circumcissileanear the base. Seeds 2-4, large, black, glabrous.\(^16\)

**ETHNOMEDICINAL USES OF CUSCUTA REFLEXA**

The rural people of Chhattisgarh use its juice in jaundice by mixing it with milk.\(^17\) Its paste is used in the treatment of Gout.\(^18\) The juice of plant mixed with the juice of *Saccharum officinarum* is used in the treatment of jaundice.\(^19\) The stem is used in the treatment of bilious disorder, internally in treating protracted fevers and externally in the treatment of body pain and itchy skin. Stems of *Cuscuta reflexa* is also used in constipation, flatulence, liver complaints and bilious affections. *Cuscuta reflexa* is also applied as a hair growth promoter.\(^20\) Seeds are said to be tonic, diaphoretic and demulcent and are used to purify the blood. The cold infusion of seeds is given as a depurative and carminatives in pain and stomach ache.\(^21\)

**CHEMICAL CONSTITUENTS**

*Cuscutin*, quercetin, amarbelin, amino acids, cuscultaline, scoparone, melanetin, hyperoside, aromadendrin, taxifolin, astragalin, myricetin, kaempferol, apigenin 7-glucopyranoside, melanettin, hyperoside, aromadendrin, taxifolin, flavonoids, saponins, glycosides, alkaloids, organic acids, reducing sugars. These constituents are reported to vary with the host on which the dodder parasitizes. On *Santalum album*, it yields D-mannitol, while on *Glycosmis triphylla* leutolin or kaempferol, and dulcitol on others. An important cell

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\(^7\) Lalchand et al / Int. J. Res. Ayurveda Pharm. B (6), 2017

\(^8\) aakashbel, aakashvalli, amarvallari, khavalli, asprsha, vyomvalika, aakashbel, amarbel, aaloklata.

\(^9\) It is mentioned under Abhyaavadivarga. Synonyms are akesavalli, amarvallari and amarbel. It has grahini (astringent), tikshna (penetrating), and pichchhil (sticky)- rog rashakproperty.

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\(^12\) Hindi - Ambarel
Bengali - Swarnlata
Malyali - Nirmuli
Gujrati - Akashel
Telugu - Nulutega
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Persian - Afirmon
Assamese - Akakhilata
English - Dodder

\(^13\) It is usually found in India and Ceylon up to an altitude of 2348 m. It is also found in Afghanistan, Malaysia, Nepal and Thailand.

\(^14\) It is a rootless climber so it is called as Aakashbel.

\(^15\) *Cuscuta reflexa* is a parasitic climber slender stem and branches.

\(^16\) Seeds are said to be tonic, diaphoretic and demulcent and are used to purify the blood. The cold infusion of seeds is given as a depurative and carminatives in pain and stomach ache.

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wall degrading enzyme, pectin methyl esterase in A and B forms have been isolated from the filaments containing haustorium.\textsuperscript{24}

**PHARMACOLOGICAL ACTIVITIES**

**Effect on Cardiovascular system**

In a series of experiments, alcoholic extracts of his plant caused a fall in blood pressure on dog. This action was not blocked by atropine, mepyramine or propranolol, thus it could not be exerted through cholinergic, histaminergic or adrenergic mechanism.\textsuperscript{27} An ethanolic extract of the stem of *Cuscuta reflexa* caused a dose-dependent decrease in arterial blood pressure and heart rate in pentothal-anaesthetized rats, and this effect was not blocked by atropine. Hypotensive and bradycardiac effects of *Cuscuta reflex* were found to be independent of cholinergic receptor stimulation or adrenergic blockade.\textsuperscript{30}

**Antidiabetic effect**

The methanol and aqueous extracts (200 and 400 mg/kg body wt) showed significant reduction in blood glucose during OGTT in diabetes rats at 3h. The treatment also resulted an improvement in body weights, decreased Hb1c and restored lipid profile. Methanolic extracts of *Cuscuta reflexa* has significant antidiabetic effects and improves metabolic alterations.\textsuperscript{31}

**Antioxidant activity**

In vitro antioxidant activity of *Cuscuta reflexa* stem extract by estimating degree of non-enzymatic haemoglobin glycosylation was measured calorimetrically at 440 nm. Ethyl acetate fraction of ethanolic extract showed higher activity than other fractions.\textsuperscript{32} Synthesized phytochelatins and carried out modulation of antioxidants in response to cadmium stress in *Cuscuta reflexa*. The effects of cadmium on growth, the antioxidative enzymes namely catalase peroxidase glutathione reductase, glutathione and phytochelatins were found in callus and seedling of *Cuscuta reflexa*.\textsuperscript{33}

**Antipycatic activity**

At the dose of 400mg/kg body weight the aqueous and ethanol extract reduced 79% and 83.8% respectively of the elevated rectal temperature as compared to reference drug Paracetamol (96.5%) after 6 hours of treatment. It appears that the antipyretic activity of *Cuscuta reflexa* may be due to inhibition of prostaglandin synthesis. Again the extracts contain flavonoids and saponins, the antipyretic potential of which has been reported.\textsuperscript{34}

**Spasmodolytic action**

Aqueous and alcoholic extracts of *Cuscuta reflexa* stem have got a relaxant and spasmylytic action on small intestine of guinea pig and rabbit. Also, the extracts exhibited acetyl choline-like action.\textsuperscript{35}

**Anti-HIV activity**

The crude water extracts of *Cuscuta reflexa* exhibited anti-HIV activity that could be due to combinatorial effects with compounds of different modes of action.\textsuperscript{36}

**Antitumor activity**

Administration of Aqueous and ethanol extracts of *Cuscuta reflexa* whole plant at doses of 200 and 400 mg/kg body weight resulted in a significant (p<0.05) decrease in tumor volume and viable cell count but increased non-viable cell count and mean survival time, thereby increasing the life span of the tumor-bearing mice. Restoration of hematological parameters – RBC, Hb, WBC, and lymphocyte count to normal levels in extract treated mice was also observed.\textsuperscript{37}

**Anti-arthritic and nephroprotective effect**

Antiarthritic activity of Aqueous and Methanol extracts of *Cuscuta reflexa* was evaluated in vivo using formaldehyde and turpentine oil-induced arthritis models and in vitro using formaldehyde and turpentine oil-induced arthritis models and in vitro using protein denaturation methods. AMECR at 600mg/kg significantly reduced paw edema and joint swelling with maximum inhibition of 71.22% at the 6th hour for turpentine oil and 76.74% on the 10th day for formaldehyde. Likewise in vitro results corroborate significant concentration dependent increase in % protection at 800 μg/mL against both bovine serum albumin (89.30%) and egg albumin (93.51%) denaturation. This result shows that AMECR provides protection against arthritis and nephrotoxicity that might be due to the existence of phytoconstituents.\textsuperscript{38}

**Anti-inflammatory activity**

Alcoholic and aqueous extract of stem of *Cuscuta reflexa* were evaluated for their anti-inflammatory activity in carrageenan induced paw edema model in rats, and compared to the activity of the standard drug, Ibuprofen. These extracts were given orally at a concentration of 100, 200 and 400 mg/kg bd. Wt. before carrageenan injection. Both the extracts with medium and higher doses i.e. 200mg/kg and 400 mg/kg have reduced edema volume by 47.27%, 72.72% and 57.72%, 80.00% respectively at 5th h as compared to standard drug Ibuprofen 96.36%. Thus this study revealed that the selected extracts of *Cuscuta reflexa* exhibited a significant anti-inflammatory activity in carrageenan induced paw oedema model in rats.\textsuperscript{39}

**Antimicrobial activity**

Ethanolic whole plant extracts obtained from *Cuscuta reflexa* were screened against Gram positive (Bacillus subtilis and Staphylococcus aureus) and Gram negative (Escherichia coli and Salmonella typhi) bacteria to evaluate their antimicrobial activity. Of the four concentrations of plant extract tested (200 μg/mL, 300 μg/mL, 400 μg/mL or 500 μg/mL), 500 μg/mL elicited the greatest zones of bacterial inhibition across three of the bacteria. In contrast, the growth of Salmonella typhi was not halted regardless of extract concentration. Overall, although the greatest antimicrobial activity was demonstrated to be against E. coli at a concentration of 500 μg/mL (24.6±0.24), upon comparison to the other bacteria, both B. cereus and S. aureus reduced similar zones of inhibition upon comparison to their positive antibiotic control the ethanolic extract of *Cuscuta reflexa* contains a myriad of compounds such as alkaloids, carbohydrates, glycosides, flavonoids, tannins, phenolic compounds and steroids. The authors determined that it is the flavonoid, glycosides contained within the plant which are responsible for the inherent antimicrobial activity. This preliminary investigation suggests that the ethanolic extracts from *Cuscuta reflexa* do possess significant antimicrobial properties.\textsuperscript{40}
Hair growth activity

The petroleum ether and ethanolic extract of *Cuscuta reflexa* were given at the dose 250 mg/kg in male Swiss albino rats. Cyclophosphamide (125 mg/kg) was used to induce alopecia. This study was shown to be capable of promoting follicular proliferation or preventing hair loss in cyclophosphamide-induced hair fall. The plant possesses specific penetrating organs, called haustorium. It causes huge loss to the crop plants every year. Still, this parasitic plant belongs to the Convolvulaceae family. Its depend upon host plant for nutrients, water & carbohydrates. *Cuscuta* lacks roots or leaves but possesses specific penetrating organs, called haustorium. It causes huge loss to the crop plants every year. Still, *Cuscuta reflexa* have some medicinal properties including antispasmodic, anti-diabetic, antimicrobial, antiviral, antihypertensive, muscle relaxant, antioxidant, hair growth promoting activity, antipyretic and antitumor. As evident by a number of studies cited above.

Different parts are used to treat different diseases and have important place in the Ayurveda. The plant needs to be explored more so that more formulations can be proposed and used practically for treatment of diseases.

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