

A parasitic Medicinal plant *Cuscuta reflexa*: An Overview

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Abstract

Traditional system of medicines relies on the plant products for the treatment of various disorders. Medicinal properties of the plant are used to cure diseases. These medicinal properties of the plant are due to the active phytoconstituents of the plants having therapeutic potential. *Cuscuta reflexa* is a parasitic weed plant having medicinal properties and have an important place in the Ayurveda. *Cuscuta reflexa* grows over the host plant and draws nutrients from host plant so the medicinal properties also depend on its host plant. Various chemicals have been isolated from this miracle plant having therapeutic potential possessing ethnomedical and pharmacological activities. This review represents a detailed survey on the studies of *Cuscuta reflexa*, its chemical constitution, ethnomedical uses and pharmacological activities.

Keywords- Medicinal plant, *Cuscuta reflexa*, Parasitic plant, Phytoconstituents, Ethnomedical

Introduction

Medicinal plants are the treasure of various hidden chemicals. In the traditional system of medicines, plant sources are major resource to cure diseases. Medicinal plants are getting attraction of most of the researches for the evaluation of new drugs, because of the polyvalent action and lesser side effects of plant products (Mahesh et al, 2008)

Since prehistoric era of mankind, treatment and cure of the diseases was one of the main concerns of human beings. Ayurveda completely depends on the plant systems for the evaluation of new chemical entities having therapeutic potentials (Dev et al, 1999). Medicinal properties of the plants are due to the active phytoconstituents present in the plants; these phytoconstituents are alkaloids, flavonoids, glycosides, saponins, tannins, terpenoids, steroids etc.

These phytochemicals possess potential health benefits, contribute in the prevention of cardiovascular diseases, cancer, osteoporosis, antioxidant activity and many more. Polyphenols have advantageous effects on cardiovascular system and play an important role in the prevention of neurodegenerative diseases and diabetes mellitus (Vita et al, 2005), (Benjamin et al, 2008).

Medicinal plants have an immeasurable ability to produce phytochemicals; most of them are phenols, aromatic substances and their oxygen derivatives. These secondary metabolites produced from the plants are enormous in the number, of which approx 15000 have been isolated, that is less than 10% of the total secondary metabolites produced by plants (Schultes et al, 1978).

Secondary metabolites produced from the plants serve as plant defence mechanism and protect plant from microorganisms, insects and

herbivores (Abdul et al, 2012). Some secondary metabolites have some other functions also, such as terpenoids which gives plant their odour, tannins and quinines are responsible for plant pigmentation, some of them are responsible for plant flavour (e.g. terpenoids capsaicin from chilli peppers) and some of them are used as herbs and spices as seasonal food yield using medicinal compounds (Cowan et al, 1999).

The promising potential of plant derived substances, plant oils and plant extracts become the basis of many applications as food preservation, pharmaceuticals, novel medicines and natural therapies. Plants are wealthy in secondary metabolites, and are major source of new chemical molecules; therefore they are a potential source of new drugs to cure various life threatening diseases (Savoia et al, 2012)

***Cuscuta reflexa*: An introduction**

Cuscuta is a group of 100- 170 species of yellow, orange, red or rarely green parasitic plants. *Cuscuta* belongs to the *Cuscutaceae* family and now on the basis of Angiosperm phylogeny group it is accepted as belonging to morning glory family, *Convolvulaceae* (Story et al, 1958). *Cuscuta* is found at the temperate and tropical regions of the world with huge species diversity in tropical and subtropical regions.

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. *Cuscuta* grows as homoparasite, it has very low level of

chlorophyll and photosynthesis activity; completely depends over the host plant for its survival.

Dodder plant sucks nutrient sap from the host plant via vascular tissue of the host plant and grows itself. This plant has no roots in the ground and it grows over the host body without touching the ground surface in its complete life span (Dawson et al, 1994).

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 (Kapoor et al, 2008).

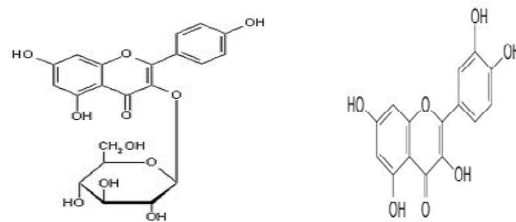
Parasitism of *Cuscuta reflexa* is wrapping around itself over the host plant after attachment with host. *Cuscuta* makes haustorial connection with the vascular tissue of the host plant. This haustorium is able to penetrate the xylem and phloem of the host plant and attached with tissues of the host plant.

Cuscuta reflexa varies in the colour of flowers produced from white to pink. Flowers generally produced in the early summer and autumn but also depend on the species. Seeds are produced in the large quantities. Seeds of *Cuscuta reflexa* can survive in the soil for many years in the search of appropriate host, at this time it depends on the food reserve in endosperm of the seed (Sarma et al, 2008)

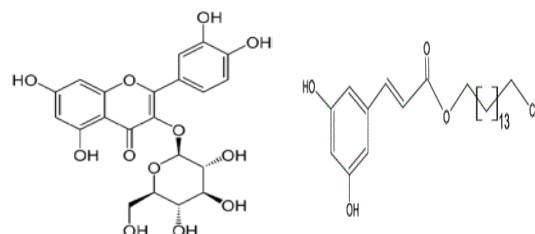
Phytochemistry of *Cuscuta reflexa*

Cuscuta reflexa is a parasitic weed plant; it sucks nutrients from the host plant for its growth and development, that's why its phytoconstituents also depends on the host plant. Various phytoconstituents have been isolated from *Cuscuta* grown on different host plants. Phytochemicals isolated from *Cuscuta reflexa* are flavonoids (Subramanian et al, 1963), dulcitol, mannitol, sitosterol, lycopene, apigenin-7- β -rutinoside, 6-7 dimethoxy coumarin, quercetin, hyperoside (Dandapani et al, 1989), (Ramachandran et al, 1992); propenamide, reflexin, lutein, carotene, amarbellin, palmitic, oleic, stearic, linolenic acids, leuteolin, cuscutin, cuscotalin, kaempferol, kaempferol-3-O-glucoside, astragalinn, benzopyrones, glucopyranosides, quercetin-3-O-glucoside, bergenin (Anis et al, 1999), (Kelker et al, 1984), (Pacheco et al, 1966).

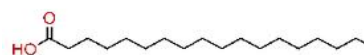
Lupeol isolated from *C. reflexa* is a pharmacologically active tri- terpenoids and posse's antimicrobial, anti inflammatory, antitumor, antiprotozoal and chemoprotective properties (Gallo et al, 2009). As an anti inflammatory agent lupeol is found to decrease interleukin 4 production by T-helper Type-2 cells (Geetha et al, 2001), (Saleem et al, 2009).



Kaempferol-3-o- glucoside Quercetin



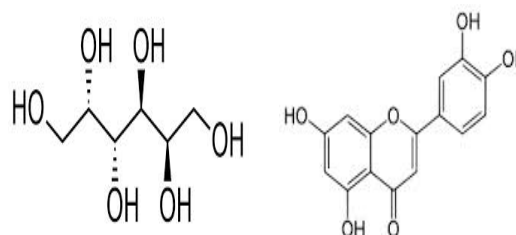
Quercetin-3-o-glucoside Cuscutin



Stearic Acid

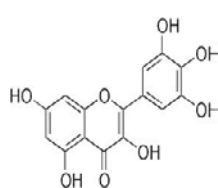


Palmitic Acid

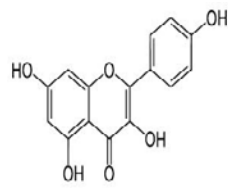


Dulcitol

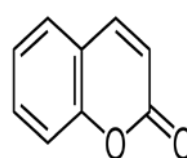
Luteolin



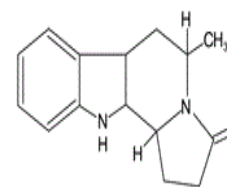
Myricetin



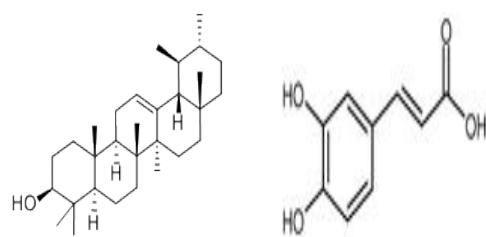
Kaempferol



Coumarin

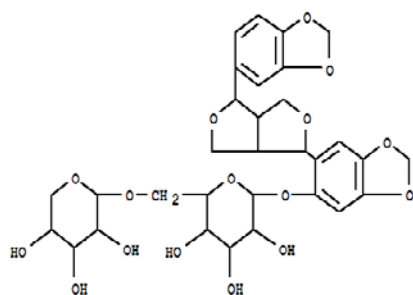


Cuscutamine



Alpha- Amyrin

Caffeic Acid



Cuscutoside- A

Figure 1: Some phytochemicals isolated from *C. reflexa*

Ethnomedical uses of *Cuscuta reflexa*

Traditional system of medicine relies on the plant sources to cure various disorders. *Cuscuta reflexa* has been studied for the identification of its plant properties to be used as medicinal plant.

C. reflexa posses antiviral, anticonvulsant activities, bradycardia, antisteroidogenic, antispasmodic and hemodynamic activities (Costa et al, 2005).

Rural people of India used juice of *C. reflexa* for the treatment of jaundice, its warm paste is used to treat rheumatism and paste of whole plant is used for the treatment of headache (Siwakoti et al, 1996). *C. reflexa* is used in the treatment of urination disorders, muscle pain and cough and also used as blood purifier. Seeds of *Cuscuta reflexa* have carminative and anthelmintic properties and used to treat bilious disorder (Khan et al, 2010).

Seeds of *C. reflexa* have neutral nature and sweet in taste; it's used in the treatment of liver and kidney disorders. This plant has the ability to control the loss of fluids from the body. *C. reflexa* is also used in the combination with other medicinal plant to cure various diseases. Juice of *Cuscuta reflexa* in the combination with the juice of *S. officinarum* is used for the treatment of jaundice.

Cuscuta reflexa is used in the treatment of constipation, flatulence, body pains, itchy skin, frequent urination, dry eyes, and white discharge from vagina, ringing in the ears, lower back pain, blurred vision and tired eyes. It is also used as hair growth promoters (Pandit et al, 2008).

Pharmacological Activities of *C. reflexa*

Parasitic weed plant *Cuscuta reflexa* has been studied for the identification of its pharmacological activities. Pharmacological activities of *Cuscuta reflexa* are as follows:

Hepatoprotective Activity

Hydroalcoholic extract of *C. reflexa* showed hepatoprotective activity in albino rats against paracetamol induced hepatic damage and act as hepatoprotective agent (Jha et al, 2011).

Antitumor Activity

Chloroform and ethanol extracts of *C. reflexa* showed antitumor activity against Ehrlich ascites carcinoma tumor in mice at doses of 200 & 400 mg/kg body weight orally. Acute oral toxicity studies were also performed to determine the safety of the extracts (Dandopani et al, 2011).

Antioxidant Activity

In vitro antioxidant activity of *Cuscuta reflexa* stems were investigated by estimating the degree

of non enzymatic haemoglobin glycosylation. Ethyl acetate and ethanol extract showed higher activity than other fractions, and very close and identical in the magnitude and comparable to the standard antioxidant agents (Solat et al, 2013).

Antibacterial Activity

Crude ethanolic extract of *Cuscuta reflexa* showed antimicrobial activity against *E. coli* and *S. Sonnei* (Ayesha et al, 2011)

Cuscuta reflexa collected from different seasons showed antimicrobial activity against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *E. coli*, *Micrococcus luteus*, *Pseudomonas aeruginosa* (Sharma et al, 2013).

Antiepileptic and Anticonvulsive activities

Cuscuta reflexa showed significantly reduction in the duration of convulsion in tonic seizure induced by pentylenetetrazole (30mg/kg ip) in mice. It also reduces the tonic extension convulsion induced by maximum electroshock-induced convulsions (Borole et al, 2011).

Hypoglycaemic activity

Methanolic extract of *Cuscuta reflexa* Roxb. and its subsequent ethyl acetate fraction showed significant inhibition against α -Glucosidase. It is a membrane bound enzyme at the epithelium of the small intestine. Inhibition of this enzyme prolongs the absorption time of glucose in the blood after a meal (Eram et al, 2002).

Anti-HIV Activity

The crude water extracts of *C. reflexa* exhibited anti-HIV activity which could be due to combinatory effects with compounds of different modes of action. The methanol extract of *C. reflexa* exhibited anti-bacterial and free radical scavenging activity (Mahmood et al, 1997).

Effect on blood pressure

Alcoholic extract of *Cuscuta reflexa* have positive inotropic and cardiotoxic activities on the perfuse frog heart. In a series of experiments on dog blood pressure, it caused a fall in blood pressure (Singh et al, 1973).

Ethanolic extract of the stem of *Cuscuta reflexa* caused a dose dependent decrease in arterial blood pressure and heart rate in pentothal-anaesthetized rats. Hypotensive and bradycardiac effects of *C. reflexa* were found to be independent of cholinergic receptor stimulation or adrenergic blockade (Gilani et al, 1992).

Relaxant and spasmolytic action

Aqueous and alcoholic extracts of the *Cuscuta reflexa* stems showed relaxant and spasmolytic action on small intestine of guinea pig and rabbit. Extracts also exhibited acetyl choline like action (Prasad et al, 1965).

Cholinergic Action

The effects of the stem extract of *C. Reflexa* resembled acetylcholine when tested on isolated rabbit ileum and frog rectus abdominis and heart. Effect of the extract on isolated frog rectus abdominis muscle was blocked by pancuronium and potentiated by neostigmine (Kayath et al, 1995).

Diuretic Activity

Aqueous and alcoholic extracts of *C. Reflexa* showed diuretic activity in Wistar rat (Sharma et al, 2009).

Conclusion

Our country is blessed with a huge number of medicinal plants. Medicinal plants are a great source of many phytochemicals that are

beneficial for the human welfare. These phytochemicals possess antimicrobial, anticancer and antioxidant potentials and can be used as a potential drug for the treatment of various diseases.

Cuscuta reflexa is called as miracle plant in the ethnobotany. *Cuscuta reflexa* is a parasitic weed plant related to the *Convolvulaceae* family. *Cuscuta reflexa* survive as holoparasites and depend on nutrients, water and carbohydrates from other host plants. *Cuscuta species* lack roots or leaves but possess specific penetrating organs, the so called haustoria, which are fully developed 5–6 days after the first contact, when an interaction between parasite and host is established.

The seeds of *Cuscuta reflexa* are alterative, anthelmintic and carminative. They are used in the treatment of bilious disorders. The stems are used in the treatment of bilious disorders. The whole plant is purgative. It is used internally in treating protracted fevers and externally in the treatment of body pains and itchy skin. The plant is employed in Ayurvedic medicine to treat difficulty in urinating, jaundice, muscle pain and coughs. The juice of the plant, mixed with the juice of *Saccharum officinarum*, is used in the treatment of jaundice. The analysis of the plant differs according to the host it is growing on.

Cuscuta reflexa is a parasitic weed plant. *Cuscuta* species causes a huge loss to the crop plants every year. Many countries have laws prohibiting import of dodder seed, requiring crop seeds to be free of dodder seed contamination. Still *Cuscuta reflexa* have some

medicinal properties including fungicidal and insecticidal properties. *Cuscuta reflexa* is called as miracle medicinal plant in the ethnobotany. Many chemical compounds have been isolated from this plant having medicinal properties. Chemical constitution and properties of *C. reflexa* also depends on the host plant on which it grows so there is a large scope for the isolation and identification of new chemical compounds possessing therapeutic potential. Different plant parts are used to treat different diseases and have an important place in the Ayurveda.

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