



A REVIEW ARTICLE ON KASMARDA

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ABSTRACT

Cassia occidentalis L is an annual or perennial ayurvedic plant which is used in severe traditional medicines to cure various diseases. Kasmarda highlight a literature review regarding its vernacular name, synonyms, classification, geographical distribution, external morphology, ayurvedic properties as well as pharmacological action from different ayurvedic Samhitas and present in modern science book and articles published in peer viewed journals. This weed has been known to possess antimicrobial activity, larvicidal activity, immunosuppression, anti-anxiety activity, analgesic activity, antidiabetic activity, antibacterial, antifungal, anti-inflammatory, anti-cancerous, antimutagenic and hepatoprotective activity and toxicological study. A wide range of chemical compounds including alicyclosin, aloin, emodin, anthraquinones, anthrones, apigenin, auroantibiotic, campesterol etc have been isolated from this plant. The presented review summarizes the information concerning the botany, ethnopharmacology, phytochemistry, biological activity and toxicity of C. Occidentalis.

KEYWORDS: Kasmarda, pharmacology, ayurvedic properties, chemical constituent, modern uses.

INTRODUCTION

Plants are the pavement brick of all the living organisms on the earth. Plants have been used as traditional medicine and pharmacological drugs from ancient times. Medicinal plants have been used for treatment of illness since ancient period. In Ayurveda, many plant information given in the Samhitas which medically use full in treatment of disease as per Ayurveda and prevention also mention. This plays a major role in developing novel drugs for the prevention of disease and treatment of disease. Therefore it is very important to have sufficient knowledge regarding herbs not only because of their widespread uses but also because they have potential to cause toxic reaction or interact with other drugs. Ayurveda is an eternal medical science basically includes medicinal uses to cure specific illness. Ancient Samhitas of Ayurveda explained medicinal uses of poisonous plants also although in traditional medicinal.

Cassia occidentalis Linn sp. pl – senna occidentalis Roxb FI. Ind II 1832 Cassia occidentalis Linn have been well known for their laxative and purgative properties and for the treatment of skin disease. Cassia occidentalis Linn has been used as folklore medicine for hepatotoxicity treatment. There is now an increasing body of scientific evidence demonstrating that the plant possesses the beneficial properties.^[1]

Cassia occidentalis L. belongs to the family caesalpinhiaceae commonly known as kasmadi in Hindi, kasmarda in Sanskrit and caesena in English. Cassia species have been used as traditional medicine in rain forest and other tropical areas for centuries and is a native plant of southern India. C. occidentalis is used to cure various diseases e.g., fever.....etc. The root, leaves, flowers and seeds have been employed in herbal medicine around the world.

Common names:^[2]

Sanskrit – kasmarda, vimarda, arimarda.
Assamese – hantthenga
Hindi – kasaunda, barikasondi, kasunda
Gujarati – kasundari
Bengali – kalkashunda .kannada – kolthogache
Malayalam – mattantakara
Orisa -- kansundri
Marathi – kasivda, kasola, rankasvinda, ran takda
Tamil – payaveripayaverai, nattamtakarai

Taxonomic classification:^[3]

Kingdom – plantae, phylum – spermatophyte
Subphylum – angiospermae, class – dicotyledonae
Order – fabales, family – fabaceae
Subfamily – caesalpinioideae
Genus – cassia
Species – cassia occidentalis

Description of plant:^[4]

A diffuse (usually annual) undershrub 0.6-1.5 m. high ;branches subglabrous, furrowed ,often purplish leaves very fetid when bruised 15-20 cm long; rachis glabrous with a single sessile gland near its base .leaflet 3-5 pairs 2.5-10 by 1.3-3.8 cm .membranous ,glaucous ovate – lanceolate, gradually attenuated to a very acute apex .glabrous above ,glabrous or finely pubescent beneath base usually rounded and somewhat oblique ;petioles very short .flowers in short peduncled few –flowered raceme ,corymbose ,axillary and forming a terminal panicle; pedicels spreading .5mm long, elongating to 1.3 cm in fruits ;bracts 1.3 cm long .ovate, acuminate ,caducous white with a pink tinge .calyx 1 cm long divided to the base ,glabrous ;segment white slightly tinged with pink oblong, obtuse membranes petal 5 ,subequal 1.3 cm long ,ovate –belong obtuse yellow ,faintly veined with orange .stamens 10,of which the three upper are reduced to staminode the anther of the remaining 7 perfect the 3 lower longer and with larger anthers than the 4 lateral ones.pods 10-12.5 and about 5 mm thick recurved glabrous compressed transversely septate, distinctly torulose. seed 20-30, ovoid, compressed at one end and rounded at the others, 6mm. long by 4 mm broad, hard, smooth, shining, dark olive-green.

Traditional uses:^[5]

1. The root is useful in ringworm, elephantiasis and scorpion sting – the leaves are tasty; aphrodisiac, alexeteric; cure cough, hiccup, asthma, "kapha" and "vata"; sweetish, bitter, stomachic; cure tridosh fever good for sore throat and biliousness.
2. The root is cure for snake bite; the juice when fresh useful in ringworm; heals wounds; cures ascites – the fruits is cure for scorpion sting –seeds are bitter; they are used in heat of the blood, for winter cough and for cough in animal (yunani).
3. The whole plant is purgative, tonic, and febrifuge .the seed and leaves are used externally in cutaneous diseases.in the konkan, the seed are used as a cure for the convulsions of children.
4. At kotra ,inkachhi the plant is considered a cure for sore eyes (hughes-buller).
5. The diuretic properties of the root are recognised not only in india but also in tahiti, Martinique, Guadeloupe, Senegal, nossi-be, La Reunion.
6. In brazil, an infusion of the root –bark is used as tonic and diuretic.
7. The plant is regarded as a panacea by the mandingo people of the gambia. the warm bath which are given for all disorders have a quality of the leaves thrown into the them.
8. In guinea, every part of the plant is considered tonic and febrifuge.the fresh leaves are ground and applied to wounds and swelling boiled they are used in lotion or fumigation. The roasted seed is an excellent diuretic.

9. A hot decoction of the leaves is given as an antiperiodic in dahomey and is preferred to quinine on account of its tonic properties.
10. A decoction of the powdered seed 1 in 10 was given in doses of ½ to 2 ounces to constipation and found to act as a mild purgative.
11. American Indians use the root as an antidote against various poisons in india the fresh root is administered internally with black pepper to counteract the effect of snake venom.

Chemical constituent:^[6]

- 1 Screening of the plant showed the presence of carbohydrate, saponin, sterols flavonoid resins, alkaloids, terpenes, anthraquinones glycoside and balsam presence of these metabolites strongly conducted the great potential of the plant as source of phytomedicine as the flavonoid and resins are present .its antiinflammatory effect on both acute and chronic inflammation.
- 2 Tannin help in wound healing and antiparasities presence of terpene suggest possessing anti-tumour and ant viral properties.
- 3 Alkaloids are known for decreasing blood pressure balancing the nervous system in case of mental illness and antimalarial properties.
- 4 Eudesmane sesquiterpenes have been reported to contain antibacterial properties saponin are believed to have antioxidant, anticancers, antiinflammatory and antiviral properties.
- 5 The anthraquinonous, emodin and chrysophanone have been reported to possess wound healing properties.
- 6 Other compound reported in literature include 1,8-dihydroxyl 2methyl anthraquinone 1,4,5 – trihydroxy, 3methyl 1,7methoxy anthraquinone, cassia occidentalis A, B and C which are c-glycosides, achrosine, campesterol, cassiolin, chryso-obtulin, chrysaphanic acid chrysarobin, chrysoerol essential oils.

Photochemistry:^[7]

The study of phytochemical of *C.occidentalis* reveal that the nature and amount of phytochemical vary according to climate for examples stems, leaves and the root bark of the plant from ivory coast ,Africa contain small amount of saponin, no alkaloids ,sterols, triterpene ,quinines ,tannin and flavonoid. However, large amount of alkaloid were found in the stem, leaves and fruits from Ethiopia

Researcher found that seed and roots are rich in free and bounded anthraquinones content is seed and less in leaves. Whole plant and root phytochemistry given below;

Whole plant

From the ethanolic extract of the whole plant of *C. occidentalis*, 3,2'-dihydroxy-7,8,4'-trimethoxyflavon-5 O- {-β-D-allopyranoside-2 (Fig. 3) have been isolated.^[38] The structures have been established on the basis of

chemical evidence and spectroscopic methods. Three new C-glycosidic flavonoids, cassia occidentalis A, B and C, were isolated from the aerial parts of *C. occidentalis*, and their structures with a 3-keto sugar were established on the basis of spectroscopic and che

Root

C.occidentalis root samples have been reported to possess 1.9% free and 4.5% total anthraquinones. Emodin, 1,8-dihydroxyanthraquinone and the flavonoid quercetin were also identified. Young roots samples have been found to possess chrysophanol and emodin. Physcion (free, bonded, reduced and oxidized) together with chrysophanol have also been reported. Along with these known anthraquinones, two xanthone derivatives pinselin and pigment E have also been observed. Later on new cassiollin was shown to be pinselin .Rhein investigation yielded 1,7-dihydroxy-3- methyl xanthone in addition to pinselin. Several 1,4,5-trihydroxyanthraquinones from the root samples like Islandicine, helminthosporine and xanthorine have been isolated. Rai and Shok in 1983.

Pharmacological activities:^[8]

1. Antimicrobial activity

A study was carried on cassia occidenatalis antimicrobial properties test was conducted with four different extracted such as methanol aqueous benzene petroleum ether and chloroform extract among which methanol extract showed positive against *p.aeruginosa* *k.pneumniae* *p.mirabilis*, *e-coli*,*s.aures* and *s.epidermide* aqueous extract was affective against *p.valgaries* *k.pneumoniae* and *p.aeniginosa* benzene and petroleum ether extracted was active against *p.mirabilis* and *e.coli*.

2. Anti-inflammatory activity

Cassia occidentalis leaf powder was test for anti-inflammatory activity and cardiospermum halicacabum aerial parts with ethanol extract was assay in male albino rat using carrageenan induced rat paw edema.

The *c.occidentalis* leaves have good anti-inflammtory activity as assayed by sadique et al.in 1987.they have used carrageenan induced paw edema and cotton pellet granuloma assay and found that *C.occidentalis* was maximally active at dose of 2000mg/kg they have also noted the ability of these extract to lower the lipid peroxide content ,gamma-glutamyl transpeptidase and phospholipase A2 activity in the exudates of cotton pellet granuloma ,resulting in the reduced availability of arachidonic acid ,a precursor of prostaglandin biosynthesis and/or by stabilization of the lysosomal membrane system.

3. Antimalarial Activity

A study with ethanolic dichloromethane and lyophilized aqueous extract of *c.occidentalis* root bark was tested for antimalarial activity against plasmodim berghei ANKA. They tested its toxicity by treating the orally and found that there was no toxic effect or mortality in mice with

single dose of 500mg/kg of body weight or same dose given twice weekly for 4 weeks

The extract produced significant chemo suppressions of parasitemia with 200mg/kg dose when administered orally *c.occidentalis* was found to be potential with 60% chemo suppression ethanolic is more active than the lyophilized aqueous extract.

4. Larvicidal activity

The larvicidal activity and pupicidal potential of cassia occidentalis was analysed in a study against the larvae of *anopheles stephensi*. The ethanol extract of cassia occidentalis were found to be more effective against larvae and pupa respectively

5. Immunosuppression

To determine the immunosuppression cyclophosphomde (cp) was administered intraperitoneally in a single dose of 50mg/kg body weight.relative organ wt lymphoid organ cellularity hemogglutination titre (HT)plaque forming cell (PFC)assay and quantative hemolysis of SRBC were analysed in animals it has suppressive effect on lymphonoid organ weight and cellularity and others paramaters of himoral immunity.

They also found out that the bone marrow cell count were much higher in plant extract treatment animal which were reduced in cp-treated animals

6. Anti-anxiety and antidepressant activity

Around 5%of world population was affected by anxiety and depression a wide spread psychiatric disorder.A recent report has studies the antianxiety and antidepressant activity of ethanolic andaqueous extract of cassia occidental leaves in rodents exposing the rats to unfamiliar aversion in different method like elevated plus moze model and actophotometer antianxiety activity was tested.

Antidepressant activity was analysed by despair swim test and tail suspension test reduced immobility time elicit antidepressant activity.

7. Analgesic activity and antipyretic activity

Cassia occidentalis linn was screened for analgesic and antipyretic activity .ethanol and water extract of cassia occidentalis leaves were screened in mice which was induced by acetic acid and tested for hot plate and tail immersion assay and also in yeast induced pyrexia method in rats they found that the ethanol and water extract of cassia occidentalis possess antinociceptive and antipyretic properties

8. Antidiabetic activity

The aqueous extract of *c.occidentalis* was tested for antidiabetic activity and the study prove that was a significant reduction in fasting blood glucose level in the normal and allaxon induced diabetic rats.they are tested for other extractes includes petroleum ether and

chloroform extract and concluded that activity from day 14 and activity from 7 days respectively histopathological studies have also revealed that pancreas of the animal showed regeneration by extract which were necrosed earlier.

9. antimutagenic/anticarcinogenic activity

A research effort on the search for the inhibitors of src-family kinase because of their involvement in many src-oncogene modulated signal transduction pathway have shown that *C.occidentalis* (a chinese antitumor medicinal plant) is quite active in this bioassay. they have selected $\text{lck(p56}^{\text{lck}}\text{)}$ protein tyrosine kinase as their initial target for identification of src-family kinase inhibitor. Ethanolic extract of senkot tablet (cassia senna concentrate used as vegetable laxative), was found to be non-mutagenic while it inhibited the mutagenicity of benzopyrene, aflatoxinB1 and methyl methanesulfonate in the ames histidine reversion assay using salmonella typhimurium tester strain TA98 and TA100. they have also found senkot extract completely inhibited the mutagenicity of promutagen. antimutagenic effect of senkot extract could be largely due to an interaction with the metabolic process involved in the activation of procarcinogenic. the *C.occidentalis* extract is found to be effective against the chromosomal aberration produced by benzopyrene and cyclophosphamide in mice.

10. Antioxidant activity/hepatoprotective activity

The hepatoprotective activity of aqueous -ethanolic (50%v/v) extract of leaves of *C.occidentalis* was studied on rat liver damage induced by paracetamol and ethyl alcohol by monitoring serum total lipid and histopathological alteration. The extract of leaves of the plant produced significant hepatoprotection. few observations have demonstrated that *C.occidentalis* seed extract reduced the DNA degradation caused by iron (II)-driven fenton reaction. they also noted that inhibition of DNA damage may be due to their strong ferrous ion chelation capability. In addition, they also proposed that it may be due to their very good scavenging activity toward free radicals. Himoliv is a polyherbal ayurvedic formulation in which *C.occidentalis* is an ingredient (20mg/5ml). Investigation has suggested that this preparation prevents the carbon tetrachloride induced hepatotoxicity in rat. they suggested that this formulation decreases the end products of lipid peroxidation or MDA in liver of rat which are elevated by CCl_4 . They also observed that Himoliv also enhanced the protective enzymes superoxide dismutase (SOD) and catalase in liver homogenate of rats.

C.occidentalis is also used in another polyherbal formulation liv 52 tablet and syrup used extensively in the management of hepatitis A. In this syrup several plants along with *C.occidentalis* are used like Capparis spinosa, Cichorium intybus, solanum nigrum, terminalia arjuna, achillea millefolium and tamarix gallica etc. A meta-analysis of 50 clinical studies over 30 years in 4490

patients was performed to evaluate the efficacy and short and long term safety of liv.52 in hepatitis A.

Toxicological studies:^[9]

The toxic effect of *C. Occidentalis* in the case of animals were found mainly on skeletal muscles, liver, kidney and heart. In animals the toxicity dose of beans varies from as small as 0.05% to 0.5% of body weight. The acute liver and muscle degeneration was chiefly observed in animals. Signs of intoxication in the chicken were weight loss, weakness, diarrhea, hypothermia, occasionally ataxia, recumbency and death. gross lesions include paleness of skeletal and cardiac muscles and congestion of the liver. In another study signs of intoxication were found in chickens as focal swelling, fragmentation and necrosis of myofibers of the semitendinosus muscle in histological section. toxicological studies on liver mitochondria demonstrated lower phosphorylation ratios, respiratory control ratios and rates of oxygen use in treated 3- to 4-week-old chicks. Seed of *C. occidentalis* were found to be toxic in pigs as they developed ataxia and other signs of neuromuscular dysfunction within 6 to 8 weeks. Toxicological studies showed lethargy, weakness, recumbency, depression and emaciation in the rat when fed with 1%, 2% and 4% of seed. Experiment showed the toxic effect of *C. occidentalis* on rabbits. The histopathological examination of rabbits revealed that the heart and liver were the most affected organs with myocardial necrosis and centrilobular degeneration. they also found a reduction in cytochrome oxidase activity in the glycogenolytic fibers, together with muscle atrophy, confirmed by the morphometric studies. Many outbreaks of acute childhood illness with severe brain dysfunction (other than Japanese encephalitis) due to consumption of seed of *C. occidentalis* occur in different parts of India. they may be at different times and at different places. The *C. occidentalis* poisoning in children seems to affect mainly three systems -hepatic, skeletal muscles, and brain. *C. occidentalis* pods cause poisoning and results in fatal coma in the children of western Uttar Pradesh. Toxicity of the cassia bean is dose dependent. the consumption of 1-2 pods by a young child may not have any deleterious impact; large 'Bing' can lead to serious disease and death. Leaves of the *C. occidentalis* plant have also been found to contain toxic phytochemicals that may be toxic to humans. A detailed study on brown shrimps for the investigation of toxicity of methanolic-chloroform extract of leaves of *C. occidentalis* revealed that this plant extract possesses a LD_{50} value of 99.5ug/ml. In further investigation the aqueous leaf extract of this plant has been found to possess hypoproteinemia effect and the level of the enzyme alanine amino transferase, aspartate amino transferase and alkaline phosphatase are significantly elevated which show *C. occidentalis* leaves may be slightly toxic as a concoction for liver ailment. however in contrast, the root, leaves and stem were found to be toxic for cattle only when large amounts are consumed but in rats toxicity of the leaves was observed at the dose of 12.5g/kg body weight in rats. Arago et al., studies the reproductive

toxicity of the *C.occidentalis* plant extract on pregnant female rats. In this study, three groups of pregnant rats were treated orally from the 1st to the 6th (pre-implantation period) and from the 7th to the 14th day (organogenic period) of pregnancy with doses of 250 and 500 mg/kg. They reported that there was no significant difference between the control and treated groups in terms of offspring/dam relationship. Placenta and ovary weight etc. however, they observed the presence of dead fetuses in both doses of 250 and 500 mg/kg of *C.occidentalis*.

CONCLUSION

A thorough review of *kasmarda* shows that *kasmarda* shows that *kasmarda* is quite promising as a multipurpose medicinal agent as it has very potential pharmacological application. From published literature its importance proves as medicine. By using *yukti pramana* one can use this drug in various diseases in different combinations.

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