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A CRITICAL REVIEW ON *JYOTISHMATI* (*CELASTRUS PANICULATUS WILLD*)

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ABSTRACT

Celastrus paniculatus Willd. (Family - Celastraceae) is wild woody liane, climbing shrub commonly known as *Malkangani, Kanguni, Sphutabandhani*, Black-Oil tree, Intellect tree, Climbing-staff plant & *Jyotishmati* & "Tree of life" in Ayurveda. It is widely described in classical literatures of Ayurveda. It is worshipped as '*Medhya' Rasayana* in Ayurveda. Celastrine and paniculatine are two major alkaloids present in seed. Oil obtained from its seed has bitter taste and useful in pain, inflammation, beri-beri. This review article deals with the ethnomedicinal uses, botanical description and many proven pharmacological actions of *Jyotishmati* such as Anti-depressant, Anti-Parkinson, Anti-Alzheimer's, Neuroprotective, IQ improving, Anti-oxidant, Anti-inflammatory, Analgesic, Immunomodulatory, Anti-arthritic, Hypolipidemic, Anti-bacterial activity.

Keywords:*Celastrus paniculatus, Jyotishmati*, Ayurveda.

INTRODUCTION: Today Ayurveda is recognized worldwide as a system of medicine that provides calm mind with healthy body. Over the past few decades, the traditional knowledge on the use of medicinally important plant has been widely acknowledged and valued across the world. The Acharyas of Ayurveda like Charaka, Susruta have focused on the importance of classical formulation. *Jyotishmati* is one of the most important medicine, which is very well described in various classical literatures of Ayurveda. *Jyotishmati* has been used in the indigenous system of medicine since long time.

Classical Uses: Acharya Caraka has mentioned *Jyotishmati* in '*Sirovirechana dravya*'. It is indicated in *Urdhwajatrugata vikaras* (diseases of ENT) like *Siroroga* (Disease of Head, *Unmada* (Psychosis), *Apasmara* (Epilepsy), *Pinasa* (Coryza) etc. Also mentioned in the treatment of *Daha jvara* and *sita jvara* (fever with burning sensation and chill) Charaka has mentioned *Jyotishmati* as one of the ingredients of '*Chandanadi Taila'* and '*Aguruvadi Taila'* respectively[1]. Acharya Susruta has mentioned *Jyotishmati* in *Sivrovirechana varga*, *Abdhobhagahara dravya* and *Tikta varga*. In *Nadivrana cikitsa*, it is mentioned in *varti* form as one of the ingredient. It is also indicated in the treatment of *kapha*, *krimi*, *Kustha*, *Prameha*. In *Uttaratantra* it is mentioned as one of the ingredients of "*Brahmyadi Varti*" for *nasya*[2]. Acharya Vagbhata *Jyotishmati* is mentioned in '*Arkadi Varga'* and is used in the treatment of *kapha*, *krimi*, *kustha*, and *Visaroga*. Also mentioned in *Tikshna dhumapana Varga*[3]. Acharya Bhela has mentioned the drug under the '*Shirovirechana varga'*. It has been also indicated in the management of *Krimi* and *Kustha* in the form of *Anulepana*[4].

Botanical Description: *Celastrus paniculatus* Willd. (Family - Celastraceae) is wild woody liane, climbing shrub

commonly known as *Malkangani*, *Kanguni*, *Sphutabandhani*, Black-Oil tree, Intellect tree, Climbing-staff plant & *Jyotishmati* & "Tree of life" in Ayurveda. Term Celastrus indicates its bushy evergreen shrub nature while the term paniculatus represents its panicle inflorescence[5,6].

This plant is native to India, China, Sri Lanka & South Africa. Distributed over North America, Asia, Japan, Australia & Pacific Islands[7]. It grows throughout India up to an altitude of 1800m from lower Himalayas to Kanyakumari[8]. Its seed oil is used from time immemorial to treat brain related disorders and to enhance intellect and sharpening memory**.** It is used in the treatment of neuronal disorders such as Alzheimer's, Parkinson, Mental retardation, depression, Insanity, Epilepsy and Coryza, Skin disease, Diabetes, Anemia, Gout, Vitamin B_1 Deficiency. The different pharmacological actions of *Celastrus paniculatus* like other medicinal plants can be attributed to the presence of array of secondary metabolites (alkaloids, flavonoids, esters, fatty acids, lipids, protein, carbohydrate & various minerals) in it[9]. Its reported activities are antiviral, antibacterial, insecticidal, anti-inflammatory, antispermatogenic, sedative, anti-fatigue and analgesic, hypolipidemic. It is arthralagenic, antirheumatic, aphrodisiac, emetic, laxative, nervine tonic[10].

Classification

KINGDOM :	Plante
DIVISION :	Spermatophyta
SUB-DIVISION :	Angiospermae
CLASS :	Dicotyledonae
SUB-CLASS :	Polypetalae
GROUP :	Disciflorae
NATURAL ORDER:	Celastrales
FAMILY :	Celastraceae
GENUS :	*Celastrus*
SPECIES :	*Paniculatus (Willd)*

Vernacular Names[8]

Arabi -	Haivekilkil Tilan Teilaphauna.
Bengali -	Lataphataki
English -	Staff tree, Black oil tree,
Farasi -	Kall
Gujarati -	Malkangni
Garhwal -	Malkauni
Hindi -	Malkanguni
Kannada -	Kouguaradu
Kumaon -	Makangni
Marathi -	Malkangoni
Malyalam -	Palulavam, Uzhinja
Punjabi -	Samkhu
Sanskrit -	*Jyotishmati*
Telgu -	Vavaji (Vekkudutoge)
Tamil -	Adibaricham
Uriya -	Katopesu
Urdu -	Malhanguni

Proven Pharmacological Actions

Anti-depressant activity

Celastrus paniculatus seed oil showed antidepressant-like activity in unstressed and chronic unpredictable mild stressed mice probably through inhibition of brain MAO-A activity, decrease in plasma nitrite levels and due to its antioxidant activity. In addition, the seed oil also showed antidepressant-like activity in stressed mice possibly through decrease in plasma corticosterone levels. This was first study which reports the antidepressant-like activity of *Celastrus paniculatus* seed oil in animal behavior despair models[11].

Anti-Parkinson activity

In a study *Jyotishmati taila* was administered in the dose of 4 drops/nostrils for seven continuous days. There was significant improvement found in the patient after seven days treatment with *Jyotishmati taila nasya.* Tremors were totally abolished, patient was able to walk without any aid, the speech was also improved and no rigidity was observed after completion of treatment. There was no side effect observed during the treatment as well as after the completion of treatment[12].

Anti-Alzheimer's activity

The crude methanolic extract of the seeds of Celastrus paniculatus along with its organic soluble fractions were tested for their possible antioxidant and anti-alzheirmer (AD) activity. The extracts showed prominent DPPH free radical scavenging activity, inhibiting activity of authentic peroxynitrite (ONOO-) and inhibition of total reactive oxygen species (ROS) generation. So it can be concluded that *C. paniculatus* seed extract and its organic fractions possesses antioxidant and moderate anticholinesterase activity. Due to these properties it is helpful to treat alzheimer[13].

Neuroprotective activity

Chronic stress was induced by subjecting rats to restrainers for 6 h a day for 21 days. CP oil (400, 600 mg/kg) or vehicle was administered intraperitoneally after stress protocol once a day over the next 14 days. After the drug treatment, open field and elevated plus maze (EPM) were used to analyze anxiety‐like behavior, and partially baited radial arm maze (RAM) and T‐maze were used to evaluate spatial learning and memory capabilities. CP oil treatment to these rats improved their performance in both RAM and T‐maze. In addition, CP oil significantly reduced stress‐induced anxiety behavior. CP oil treatment showed ameliorating effect on chronic restraint stress‐induced cognitive deficits. CP restored spatial learning and memory, showed anti‐anxiety activity in stressed condition[14].

IQ improving activity

A study was conducted to evaluate the efficacy of *Jyotishmati* Oil with Pranayam on I.Q. (Intelligence Quotient) on mental age. The selected children were grouped in three groups, 30 children in each group. Group A and Group B considered as experimental group. In-group 'C' no intervention was done. In this study *Celastrus paniculatus* oil was administered orally at the dose of 0.25ml twice daily with Anupana of Milk in children for 180 days. In all the groups, Group B showed maximum improvement in Mental Age[15].

Effect in Thiamine (Vit.B_1) Deficiency

Jyotishmati has been successfully used in thiamine deficiency that is beriberi, associated with nervous symptoms. The use of *Celastrus paniculatus* in beriberi is of great interest because *Celastrus paniculatus* doesn't contain thiamine. Thiamine deficiency results in memory and learning deficiency because it reduce the function of acetyl choline. So *Celastrus paniculatus* is known to be effective against both the factors it can be considered that *Celastrus paniculatus* may have acetyl choline enhancing activity[16].

Antioxidant activity

Petroleum ether extract of *Celastrus paniculatus* exhibits free radical scavenging. The plant extract of *Celastrus paniculatus* has shown statistically significant result in their estimation of in-vitro antioxidant activity. Petroleum ether extracts contain terpenoids, steroids, alkaloids, flavonoids, tannins, carbohydrate, amino acid, glycosides, and phenolic compounds etc. which have been reported to be responsible for potential bioactive constituents[17].

Ant-cancerous activity

In a study β-dihydroagarofuranoid sesquiterpenes were isolated from the whole plant, of which the major constituent is (1α,2α, 8β,9β)-1,8-bis(acetyloxy)-2,9-bis(benzoyloxy)-14-hydroxy-β-dihydroagarofuran. It was assessed for its antiproliferative activity, and it suppressed the viability of MCF-7 breast cancer cells with an IC50 of 17±1μM. This growth inhibition was, in part, attributable to apoptosis. Western blot analysis established its ability to target a broad range of signaling effectors related to survival and cell cycle progression, including Akt, NF-κB, p53, and MAP kinases. In addition, flow cytometry analysis indicates increased reactive oxygen species production in response to this compound. Taken together, these findings suggest a pleiotropic mode of

mechanism that underlies the antiproliferative activity of this compound in MCF-7 breast cancer cells[18].

Anti-inflammatory activity

A study was performed to evaluate the anti-inflammatory activity of ethanolic and methanolic extracts by carrageenan induced hind paw odema method on the albino rats and compared with diclofenac sodium as reference and it shows significant anti-inflammatory activity. The pharmacological studies of methanolic and ethanolic extracts of *Celastrus paniculatus* seeds revealed that they have remarkable inhibition in the inflammation i.e. 60.02 and 70.04% at 4th hour. Result showed that *Celastrus paniculatus* seeds possess considerable anti-inflammatory. The adverse effects of the synthetic pain killers can be minimized by the use of extracts of *Celastrus paniculatus*[19].

Analgesic activity

The analgesic efficacy of *C. paniculatus* leaf extracts was evaluated by acetic acid induced writhing method in mice to assess analgesic activity. The methanol extract was found to be the most potent followed by the ethyl acetate and petroleum ether extracts respectively. This preliminary study confirms marked analgesic activity of *C. paniculatus* leaf which may be due to presence of multitude of chemical constituents present in the plant extracts[20].

Immunomodulatory activity

A study was conducted to evaluate the immunomodulatory property of petroleum ether extract of seeds of *Celastrus paniculatus* (PECP) on immunological, hematological and oxidative stress parameters using pyrogallol induced immunosuppression model in rats. A dose of 500mg/kg was administered orally. The results of the study suggest that PECP stimulates humoral immunity as indicated by increase in antibody titre and cell mediated immunity. The study affirms that the PECP is effective immunomodulatory agent[21].

Anti-arthritic activity

Petroleum ether fraction of *Celastrus paniculatus* (PECP) was evaluated in Sprague-Dawley rats. Adjuvant arthritis was induced in rats by sub-planter injection of complete freund's adjuvant into left hind paw. PCP (100, 200 and 400 mg/kg) significantly ameliorated the arthritis severity in terms of arthritic score, paw volume, paw circumference and joint diameter. Serum levels of NO, MDA, AST, ALP and Alt were significantly decreased when compared with arthritic rats. The increased levels of IL-6 and TNF-α were significantly reduced in treatments groups. This result suggest that anti-arthritic effect of PCP may be due to immunodepressive effect, cytokine regulation and anti-oxidant property[22].

Antibacterial activity

A sesquiterpene derivative celapanin was isolated from the acetone soluble fraction of an ethanol extract of Celastrus paniculatus leaves. The antibacterial activity of the crude ethanol extract and the isolated purified constituent celapanin was screened against 30 clinical strains isolated from different infectious sources which belonging to Gram-negative *Pseudomonas aeruginosa*, and *Klebsiella pneumonia*, and Gram-positive *Staphylococcus aureus*. The minimal inhibitory concentrations of the ethanol extract and the and the constituents celapanin were determined against American and Microbial type cell culture strains. Celapanin indicated that its effect was bacteriostatic. The antibacterial activity of celapanin was against gram-positive *S.aureus*, comparative with the standard drug Ciprofloxacin[23].

Hypolipidemic activity

Hypolipidemic effect of methanolic extract of *Celastrus paniculatus* was evaluated in experimentally induced hypercholesterolemic rats. Hypercholesterolemia was induced by feeding the animals with high fat diet. Oral administration of methanolic seed extract

(50%) of Celastrus paniculatus at the optimized dose of 65 mg/kg body weight, substantially reduced the plasma total cholesterol, triglycerides and LDL cholesterol in comparison with induced hypercholesterolemic animal group and the results were comparable with the standard hypocholesterolemic drug and almost similar to the control group. Apart from lowering serum lipid level, the seed extract also reduced the cholesterol deposition in the aorta of high cholesterol diet animals. Thus the hypocholesterolemic effects of *C. panicualtus* seed extract can be probably explained by its known properties to stimulate bile fluid secretion as well1 as biliary cholesterol secretion and enhance excretion of bile acids in feces[24].

DISCUSSION

This review article reveals that *Celastrus paniculatus* has many medicinal properties. It is called 'Tree of life' in Ayurveda. *C. paniculatus* is being used traditionally and several other uses are practiced in the tribal populations. Its seed oil is used from time immemorial to treat brain related disorders and to enhance intellect and sharpening memory. *Jyotishmati* by its *Ushna, Tikshna Gunas, Ushna Virya* and *Katu Vipaka* increases *pitta*. Increased *pitta* stimulates *Sadhakagni* which in turn generates *Medha*. Likewise due to its *Ushna, Tiksna Guna* and *Katu Rasa* it breaks the '*Avarana'* of *Kapha* and *Tama* in abnormal state; due to which again functions of *Buddhi*, *Medha* and *Smriti*, are normalized. *Jyotishmati* oil performs dual function of stimulation of *Agni* and nourishment of *Medha*. Thus *Jyotishmati* is effective medicine for the treatment of *Manasa roga* like *Unmada* and *Apasmara.* Modern researches are revalidating the tribal uses of *Jyotishmati*. It has been investigated for different pharmacological properties like Anti-depressant, Anti-Parkinson, Anti-Alzheimer's, Neuroprotective, IQ improving, Anti-oxidant, Anti-inflammatory, Analgesic, Immunomodulatory, Anti-arthritic, Hypolipidemic, Anti-bacterial activity. Further investigations are needed to explore the exact active constituents and mechanisms of pharmacological actions.

CONCLUSION

Oil extracted from its seed is used in treatment. Ayurveda, a holistic health care system prescribes usage of different medicated oils for application on the body, with or without massage for providing health benefits and to treat specific indications. Medicated formulations prepared using process as mentioned in Ayurveda are used for external and internal administrations to treat various disorders especially in mental disorders.

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