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PHYTOCHEMICAL AND PHARMACOLOGICAL REVIEW OF ETHNO MEDICINAL PLANT: *JATROPHA CURCAS* L.

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Abstract-
Jatropha curcas (Family:Euphorbiaceae); Physic nut a drought-resistant shrub or tree, which is widely distributed in the wild or semi-cultivated areas in Central and South America, Africa, India and South East Asia. Jatropha curcas is a drought resistant, perennial plant that grows even in the marginal and poor soil. Raising Jatropha is easy. It keeps producing seeds for many years. In the recent years, Jatropha has become famous primarily for the production of biodiesel; besides this it has several medicinal applications.The *Jatropha curcas* L. plant is used as a medicinal plant such as seeds against constipation; sap for wound healing; leaves as tea against malaria etc.Seeds used to treat arthritis, gout and jaundice.Stem acts in toothache, gum inflammation, gum bleeding, pyorrhoea.Plant extract used in treatment of allergies, burns, cuts and wounds, inflammation, leprosy, leucoderma, scabies and small pox.Water extract of branches is used in Human immunodeficiency virus, tumour and Plant extract in wound healing. Plant sap in dermatomucosal diseases.

Keywords-Dermatomucosal, *Jatropha curcas,* Euphorbiaceae, Human immunodeficiency virus

Plant

Jatropha curcas (Family:Euphorbiaceae); Physic nut a drought-resistant shrub or tree[1], which is widely distributed in the wild or semi-cultivated areas in Central and South America, Africa, India and South East Asia.[2, 3] It grows almost anywhere except waterlogged lands, even on gravelly, sandy and saline soils. It will grow under a wide range of rainfall regimes from 250 to over 1200 mm per annum. Today it is cultivated in almost all tropical and subtropical countries.Itoriginates from Central America. It is used as antibacterial, antifungal, antioxidant, antidiabetic agent.[4, 5]

Botany

Jatropha curcas L. is a bush or small tree and contains approximately 170 known species.It is a small tree or shrub with smooth gray bark, which exudes whitish coloured, watery, latex when cut. Normally, it grows between three and five meters in height, but can attain a height of up to eight or ten meters under favourable conditions.[6] Different parts of plant showed the description as:

- **Roots**

Normally, five roots are formed from seedlings, one central and four peripheral. A tap root is not usually formed by vegetative propagated plants.[7]

- **Leaves**

Leaves five to seven lobed, hypostomatic and stomata are of paracytic (Rubiaceous) type.[8]

- **Flowers**

The plant is monoecious and flowers are unisexual; occasionally hermaphrodite flowers occur. The petiole length ranges between 6-23 mm. Ten stamens are arranged in two distinct whorls of five each in a single column in the androecium, and in close proximity to each other.[9]

- **Stem**

The branches contain latex.[10]

- **Fruits**

Three, bivalved cocci is formed after the seeds mature and the fleshy exocarp dries**.**[11]

- **Seed**

The seeds are black and the seed weight per 1000 is about 727 g, there are 1375 seeds/kg in the average. The physic nut is a diploid species with 2*n* = 22 chromosomes.[12]

Fig. 1: *Jatropha curcas* plant

Constituents and properties

- **Stem**

Three deoxypreussomerins, palmarumycins CP_1, JC_1, JC_2 isolated from stem of *Jatropha curcas* L. In which JC1 and JC2 shows the antibacterial action.[13]

- **Aerial parts**

Organic acids (*o* and *p*-coumaric acid, *p*-OH-benzoic acid, protocatechuic acid, resorsilic acid), saponins and tannins have been reported from aerial parts of *Jatropha curcas* L.[14]

- **Stem bark**

Amyrin, sitosteroland taraxerol were isolated from stem bark of plant.[15]

- **Leaves**

The different extract of the leaves yielded a number of constituents. Cyclic triterpenes stigmasterol, stigmast-5-en-3, 7 diol, stigmast-5-en-3, 7 diol, cholest-5-en-3,7 diol, campesterol, sitosterol, 7-keto--sitosterol as well as the d-glucoside of Sitosterol, Flavonoids apigenin, vitexin, isovitexin, dimer of a triterpene alcohol ($C_{63}H_{117}O_9$) and two flavonoidal glycosides were isolated and characterized.[16, 17]

- **Latex**

Latex yield Curcacycline A, a cyclic octapeptide Curcain (a protease).[18]

- **Seeds**

Curcin, a lectin Phorbolesters Esterases (JEA) and Lipase (JEB) have been reported in seeds of *Jatropha curcas.*

- **Kernal and press cake**

Phytates, saponins and a trypsine inhibitor have been isolated from Kernal and press cake of plant.[19]

- **Roots**

Sitosterol and its d-glucoside, marmesin, propacin, the curculathyranes A and B and the curcusones A–D. diterpenoids jatrophol and jatropholone A and B, the coumarin tomentin, the coumarino-lignan jatrophin as well as taraxerol were isolated and characterized from different extract of roots of *Jatropha curcas*.[20,21]

Traditional Medicinal Uses of Plant Parts

The *Jatropha curcas* L. plant is used as a medicinal plant such as seeds against constipation; sap for wound healing; leaves as tea against malaria etc.

- **Seeds:** Seeds used to treat arthritis, gout and jaundice.[22]

- **Tender twig/stem:** Stem acts in toothache, gum inflammation, gum bleeding, pyorrhoea.

Plant extract used in treatment of allergies, burns, cuts and wounds, inflammation, leprosy, leucoderma, scabies and small pox.[23, 24]

Water extract of branches is used in Human immunodeficiency virus, tumour and Plant extract in wound healing.[25]

- **Plant sap:** Plant sap in dermatomucosal diseases.[26]

Species of *Jatropha*[27]

- ***Jatropha glandulifera*Roxb.**

It is native to South India and Bengal. Its oil is antirheumatic, antiparalytic and used externally onringworm and chronic ulcers.

- ***Jatropha gossypifolia*Linn.**

This plant isnative to Brazil; cultivated as an ornamental. Seed fatty oil used in paralytic affections, also in skin diseases. Hot water extract of the plant exhibits antimalarial activity against *Plasmodiumfalciparum.*

- ***Jatropha multifida*Linn.**

It isnative to South America and in various parts of India. The latex from the plant showed antibacterial activity against *Staphylococcusaureus.* It contains immunologicallyactive acylphloroglucinols, multifidol, phloroglucinol and multifidol beta-D-glucopyranoside.

- ***J. panduraefolia* Andr.**

J. panduraefolia Andr. (native to America), widely grown in Indian gardens, is known as Fiddle-leaved Jatropha. The latex from the plant shows fungitoxic activity against ringworm fungus, *Microsporum gypseum.*

1.1.1 Taxonomical Classification[28]

Kingdom	:	Plantae – Plants
Subkingdom	:	Tracheobionta – Vascular plants
Superdivision	:	Spermatophyta – Seed plants
Division	:	Magnoliophyta – Flowering plants
Class	:	Magnoliopsida – Dicotyledons
Subclass	:	Rosidae
Order	:	Euphorbiales

Family	:	Euphorbiaceae – Spurge family
Genus	:	*Jatropha*L. – nettlespurge
Species	:	*Jatrophacurcas* L. – Barbados nut

1.1.2 Vernacular Names[29, 30]

English	:	Physic Nut, Purging Nut
Ayurvedic	:	Vyaaghrairanda (var.), Sthula-eranda, Kaanan-eranda
Siddha/Tamil	:	Kattu Amanaku.
Sanskrit	:	Kananaeranda
Hindi	:	Jangli arandi
Bangali	:	Bon-bheranda
Gujrati	:	Nepalo
Persian	:	Dandenahri

Literature review of plant Sawant *et al.*(2010)[31] evaluated the antioxidant activity in hydro-alcoholic extract of the leaves and extracts obtained from residuesof nodes leaves, stem and root of *Jatrophacurcas*L.

Mishra *et al.*(2010)[32]evaluated the antihyperglycemic effect of 50% ethanolic extract of leaves of *Jatropha curcas* L. (JCE) in normal and alloxan induced diabetic rats.

Donlaporn*et al.*(2010)[33]evaluatedthe antifungal activities in ethanolic extract of *Jatropha curcas* L. seed cake against important fungal phytopathogens: *Fusarium oxysporum, Pythium aphanidermatum, Lasiodiplodia theobromae, Curvularia lunata, Fusarium semitectum, Colletotrichum capsici,* and *Colletotrichum gloeosporioides*. The extract contained phorbol esters mainly responsible for antifungal activities.

Gupta *et al.* (2010)[34] evaluated the antimicrobial and cytotoxic activities of petroleum ether, ethyl acetate and methanol extracts and compounds isolated from the ethyl acetate extract of *Jatropha curcas* (Euphorbiaceae) against the gram positive and gram negative bacteria.

Sangeetha *et al.*.(2010)[35]evaluated the analgesic, anti-inflammatory and antibacterial activity of *Jatropha curcas* Linn. using formalin induced paw edema method, eddy's hot plate method and disc diffusion method respectively.

Diwani *et al.*(2009)[36]evaluated*in vitro* antioxidant activity in Egyptian *Jatropha*by using DPPH radical scavenging activity, nitric oxide radical scavenging activity, hydroxyl radical scavenging activity, reducing power method and hydrogen peroxide radical scavenging activity.

Balaji*et al.*(2009)[37]evaluated the hepatoprotective activityon aflatoxin b_1 induced hepatic carcinoma in methanolic fraction of *Jatropha curcas* L.

Esimone*et al.*(2009)[38]evaluated the wound healing activity in wistar albino rats of herbal ointment containing the leaf extract and bark extract of *Jatropha curcas* L.

Balaji *et al.*(2009)[39]evaluated the anti-metastatic and anti-proliferative activity in methanolic fraction of *Jatropha curcas* L. using $B_{16}F_{10}$ melanoma cells in C_{57}BL/6 mice. It was studied using MTT (3-[4,5- dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide; Thiazolyl blue) assay and the IC_{50} was found to be 24.8 μg/ml.

Igbinosa *et al.*(2009)[40] evaluated the antimicrobial activity inmethanolic, ethanolic and water extracts of stem bark from*Jatrophacurcas* L. against *S.aureus, P.aeruginosa,E.coli,S.faecalis.*

Wang *et al. (*2009)[41]evaluated the allelopathiceffects of *Jatropha curcas* on marigold (*Tagetes erecta* L.).Leaf leachates of *Jatropha curcas* L. in the soil significantly inhibited the shoot and root length of marigold compared to unamended soils. The leaf leachates increased the relative leaf moisture percentage on fresh weight basis (RMP) and proline content in the roots of marigold seedlings.

Kannappan *et al*.(2008)[42]evaluated that methanolic extract of *Jatropha curcas* L. exhibit the antiulcer activity by aspirin induced gastric lesions in wistar rats.

Ahirrao*et al.*(2008)[43]evaluated the anthelmintic activity in aqueous extract of leaves against *Pheretima Poshtuma*.

Yan*et al.*(2008)[44]has shown a correlation between responses of antioxidant enzymes as well as phenylalanine ammonia lyase (PAL) activities and nickel concentration in *J. curcas* cotyledons. The low nickel conc. and higher superoxide dismutase (SOD), peroxidise (POD), catalase (CAT) and phenylalanine ammonia lyase (PAL) activities suggest the tolerance capacity of protect the plant from oxidative damage.

Oyi*et al.* (2007)[45]evaluated the antimicrobial screening and stability studies of liquid, dried (powdered) latex and ethyl acetate extract (EAE) extract of *Jatropha curcas* Linn latex against *Bacillus subtilis.* NCTC 8326, *Escherichia coli* NCTC 10418. *Pseudomonas aeruginosa* NCTC 6750.*Stapylococcus aureus*NCTC 6571, *Streptococococcus pyogenes* NCTC 8198, *Candida albicans.Trichophyton sp.*

Shetty *et al.* (2006)[46]accelerated the healing process by increasing the skin breaking strength, granulation tissue breaking strength, wound contraction, dry granulation tissue weight and hydroxyl-proline levels in *Jatropha curcas*L.

Adebowale *et al.* (2006)[47]evaluated thechemical composition and insecticidal properties of theunderutilized *Jatropha curcas* seed oil using standard techniques. The studysuggests that*J. curcas* has antioviposition and ovicidal effects on *C. Maculates.*

Mujumdar*et al*.(2004)[48]evaluated thatthe methanolic extract of *Jatropha curcas* root exhibited systemic and significant anti-inflammatory activity in acute carrageenan-induced rat paw edema. It also showed activity against formalin-induced rat paw edema, as well as, turpentine-induced exudative changes and cotton pellet-induced granular tissue formation in mice and rats.

Goonasekera*et al*.(1995)[49]evaluated that foetal resorption occur with methanol, petroleum ether and dichloromethane extracts of the fruit in rats.It suggests that the interruption of pregnancy occurred at an early stage after implantation.

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