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REVIEW STUDY ON PHARMACOLOGICAL IMPORTANCE AND TRADITIONAL USES OF *ARTOCARPUS HIRSUTUS LAM*

Pharma

KEYWORDS : Artocrpus hirsutus,hortus malabaricus, infusion of bark,vata and pitta

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ABSTRACT

Artocarpus hirsutus Lam. an endemic species of southern Western Ghats commonly called as 'wild jack' is less explored for its medicinal potentials. It forms one of the major keystone species of Western Ghats. However, there is documentation of its medicinal properties in the third volume of Hortus Malabaricus, a book on the natural plant wealth of Asia. Wild jack is a tropical evergreen tree that is native to India (Karnataka, Kerala, Maharashtra and Tamil Nadu), where it prefers moist, deciduous to partially evergreen woodlands. The Artocarpus hirsutus grows in altitudes ranging from sea level to an elevation of 1000 m in places with an annual rainfall of 1500 mm or more. Fruits are edible. Wood yellowish brown, moderately hard, durable, seasons and polishes well, does not wrap or crack, not eaten by white ants, valuable for construction work (beams, rafters, door and window frames), panelling, flooring, furniture, cooperage, agricultural implements and boat building. It can also be used for tea boxes. Infusion of bark applied to cure pimples and cracks on the skin. Powdered bark used to heal sores; dry leaves useful in treating buboes and hydrocele; unripe fruit astringent, ripe fruit appetizer, cooling, aphrodisiac, and useful in vitiated condition of vata and pitta, and anorexia.

INTRODUCTION

Wild Jackfruit also called Wild Jack with latin name *Artocarpus hirsutus Lam.* belongs to the Moraceae family. *Artocarpus hirsutus* is a tall evergreen tree, generally 20-25 m in height and up to 5 m in girth; fruits are edible, bright yellow, ovoid covered with spines, seeds ovoid and white. It required warm humid climate heavy rainfall and thrives week in any type of soil. It is common in Western Ghats form north Karnataka to Malabar Coast and Travancore.[1] *Artocarpus hirsutus* (wild jack) endogenous to Kerala has wide medicinal values which are well documented in the third volume of Hortus Malabaricus, the oldest comprehensive printed book on the natural plant wealth of Asia. The decoction of roots and bark are supposed to cure diarrhea. The leaves when used with white camphor and root of curcuma are believed to treat venereal bubones and chronic hemorrhage respectively. The juice from the cooked unripe fruits are believed to induce appetite and also when applied to the anus relieve the pains of hemorrhage[2].

PLANT PROFILE

Common name : Wild Jack Fruit or jungle jack fruit tree
Malayalam : Anjili, Aani
Kannada : Hebbalasu
Tamil : Aiyinipila
Hindi : Vadahar
Telugu : Adavi panasa
Sanskrit : Lakucah

Scientific classification:

Kingdom : Plantae
Order : Rosales
Tribe : Artocarpeae
Family : Moraceae
Genus : Artocarpus
Species : A. hirsutus

A large handsome evergreen tree, 20-40 m tall and 2-3.5 m girth. **Bark** 1-1.5 cm thick, brownish grey, smooth, lenticellate, pealing into thin flakes exposing red surface, inner bark fibrous. **Blaze** white turning pinkish yellow. **Latex** milky white, thick, sticky. Branchlets robust, horizontally drooping, hairy. **Leaves** simple, alternate, broadly egg-shaped or elliptic. 12-25x 7-15 cm, base rounded or truncate, apex bluntly acute, margin entire and wavy, leathery, with sparsely scattered hairs above, densely hairy below; lateral nerves 7-11 pairs, prominent; lead stalks 3 cm long, hairy. Male and female flowers very minute, numerous, greenish yellow, separately seen in different heads of the same plant in the leaf axils. Male heads cylindrical, about 15 x 1cm, pendulous with age, on about 3 cm long hairy peduncles. Female heads ovoid, about 3 x 1.5 cm. mature fruits globose to avoid, 10-15 x 8-12 cm, covered by numerous long spine-like projections, ripening orange-yellow. Seeds 1-2 cm long, ovoid, white.[1]

REVIEW OF LITERATURE

Akhil Hari *et al*., reported as the plant *Artocarpus hirsutus* (wild jack), *Artocarpus lakoocha* and *Artocarpus camansi* (bread nut) are the important species belonging to this genus. These species are known to possess potential phytochemicals and high nutritional value. The decoction of roots and bark are supposed to cure diarrhea. The leaves when used with white camphor and root of curcuma are believed to treat venereal bubones and chronic hemorrhage

respectively. The juice from the cooked fruits are believed to induce appetite and also when applied to the anus, relieve the pains of hemorrhage.[2]

Anu V *et al*. reported the nanotechnology is a fast emerging discipline not only in physics and chemistry but also in the field of biology. Nanoparticle synthesis and the study of their size and properties are of fundamental importance in the advancement of recent research in the field of medicinal search. The leaves of *Artocarpus hirsutus* were used to synthesize silver nanoparticles. Silver nitrate is used as reducing agent as silver has distinctive properties such as good silver conductivity, catalytic and chemical stability. The aqueous silver ions when exposed to plant extracts were reduced in solution, there by leading to the formation of silver hydrosol. The time duration of change in color varies from plant to plant. The synthesis of SNPs had been confirmed by measuring the UV-Vis spectrum of the reaction media. The preliminary analysis of the extracts was performed to determine the presence or absence of the primary or secondary metabolites. The nanoparticles synthesis by green route was found toxic against bacterial species at a concentration of 100 micro liter Ag nanoparticles revealed higher antimicrobial activity against *Staphylococcus aureas* and *E.coli*.[3]

Dibinlal D *et al.*, reported as the *Artocarpus hirsutus Lam* (Wild jack) belonging to the family Moraceae a large evergreen tree up to 70m height, found up to an altitude of 1200M in evergreen India. The wood is straight blackish brown in color; it is very strong tree and has main advantage of lightness. It is used for the treatment of ulcers, diarrhea and pimples. The present study includes Pharmacognostical studies of the bark of *Artocarpus hirsutus Lam*.[4]

Vinay suvarna *et al*., reported as the plant *Artocarpus hirsutus* to evaluate Phytochemical Analysis and Antimicrobial Activity of *Artocarpus Hirsutus*: An In Vitro Study. In the present study effort was aimed to evaluate phytochemical components and antimicrobial activity of *Artocarpus hirsutus* edible fruit part with different organic solvent extracts by Soxhlet extraction method with analytical grade solvents viz., methanol and petroleum ether. This study reveals the presence of phytochemical components like alkaloids, flavonoids, saponins, and terpenoids. The study shows the effective antimicrobial activity against *Staphylococcus aureus* and *Klebsiella pneumoniae* bacterial strains with maximum zone of inhibition compared with standard drug tetracycline.[5]

D. Dibinlal *et al*., reported as the anti ulcer activity of the bark of ethanolic extract of *Artocarpus hirsutus* Lam. It protects experimental animals from gastric ulceration induced by pylorus ligation. The test sample reduced gastric secretory volume, acidity and ulceration of pylorus ligated rats.[6]

Vinay suvarna *et al*., reported as the evaluation of *Artocarpus hirsutus* show potency of antioxidant activity. The methanolic fruit extract of *Artocarpus hirsutus* was found to be effective in DPPH radical scavenging activity. The DPPH radical scavenging activity of the extract was increased with the increased concentration of crude plant methanolic fruit extract. The reducing power of the extract was carried out with ascorbic acid as a standard reducing agent. The methanolic fruit extract was potentially exhibited concentration dependent DPPH radical scavenging and reducing power is an increased quest to obtain natural antioxidants with broad-spectrum actions.[7]

Thakur S *et al*., reported as the present study was conducted to evaluate the physical characters of *Artocarpus hirsutus* fruits collected from two different altitudinal zones viz., midlands and lowlands of Trissur district, Kerala. As observed, fruit weight, volume, length and diameter in the different zones ranged from 111.15 to 152.43 g, 83.94 to 116.97 cm^3, 69.57 to 76 mm and 57.04 to 63.19 mm, respectively. Also, mean number of seeds per fruit was 14.14 in midland and 35.76 in lowland. Correlation matrix computed for physical parameters like fruit weight, volume, length and diameter showed a significant and positive relation between these parameters in both the zones. In midland, mean pulp, peel, seed and core percentage was 11.87, 63.28, 10.18 and 14.67, respectively while in lowland these values were found to be 15.49, 54.66, 17.87 and 11.98, respectively. Based on fruit size classes, significant variation was observed for biochemical and mineral composition of the fruits with bigger fruit size class showing maximum values. Hence, indicating the possibility of selecting the fruits based on their size for further processing.[8]

Sam P Mathew *et al*., reported the Bio-cultural Diversity of the Endemic 'Wild Jack Tree' (*Artocarpus hirsutus*) on the Malabar Coast of South India. *Artocarpus hirsutus* is an endemic tree species of the southern Western Ghats of Peninsular India. It is popularly known as the 'wild jack tree. Several attributes in art, culture and socio-economic civilization among the folk communities in Kerala state (Malabar Coast) distinguish the tree in the history of Indian civilization. Most of the traditional uses and indigenous know-how earlier referred to this species are vanishing. This article discusses various aspects of the popular wild jack tree of the Malabar Coast and its vanishing indigenous bio-cultural diversity among the folk communities of the region. Seed oil used as appetite stimulant. Seeds roasted with crushed onion fried in yogurt and

Inserted rectally to treat constipation. Leaves crushed with turmeric (*Curcuma longa* L.) can treat chronic hemorrhage with continuous application and used as part of a camphorated poultice for the treatment of swelling of testicles originating from contusion. (A folk medicine in northern Kerala). Bark (ash) mixed with coconut oil is used externally against 'dhobi's itch' and ringworm and Bark (paste) in coconut oil also can apply for snake bite and for domestic animal bone fractures: mixed with palm sugar made into a thick paste on fracture. Dried leaves used for joint pain and rigidity.[9]

Sheeba Rebecca Isaac *et al*., reported a comparative study on in situ and ex situ decomposition dynamics of wild jack (*Artocarpus hirsutus*) leaf litter was conducted in a home garden of Southern Kerala, India. Results of the litter bag study indicate that under the canopy 95% of the litter mass disappeared in about 17 fortnights, whereas in the open it took approximately 19 fortnights. Weight loss followed a negative exponential model and the half-lives were 9.45 and 10.31 fortnights respectively for in situ and ex situ decomposition. Nutrient dynamics exhibited temporary phases of immobilization for both N and P, while K release was continuous.[10]

Karmakar Ruma *et al*., reported the diversity of fungal endophytes from two endemic tree species *Artocarpus hirsutus Lam.* and *Vateria indica Linn.* of Western Ghats, India. In this study 106 endophytic fungi from *Artocarpus hirsutus Lam.* and *Vateria indica Linn.* Two endemic medicinal plants of Western Ghats were documented using traditional morphological methods. The frequency dominant genera were *Coniothyrium* spp. (96.5%), *Trichoderma* spp. (84.5%), *Mortierella* sp. (36.75%), *Phyllosticta* spp. (19%) and *Acremonium* spp. (21.5%). The other endophytes recovered belong to class Ascomycetes and Hyphomycetes i.e. *Aspergillus* spp. *Colletotrichum* spp. *Fusarium* spp. and *Penicillium* spp. higher number of isolates was recovered from the bark of the plants than from twigs. Endophytes from *A. hirsutus* bark and showed the highest diversity index. Endophytes, especially those from medicinal plants have become the focus of research for bioactive secondary metabolites with pharmaceutical applications. The reason for this is high diversity of endophytes, easy to apply statistics, easy to study and easy to scale up. Endophytes appear to be a microbial factory for bioactive molecules with relatively untapped bioresources *viz.* pestacin and isopestacin from *P. microspora.* Taxol from *Colletotrichum.* gloeosporioides and deacetylisowortmin and wortmannin isolated from *Trichoderma* sp. with potent antioxidant, anti-cancer and anti-microbial activities, respectively.[11]

Asha D.S *et al*., reported the present study aims to evaluate the comparative antibacterial properties of bark and stipule samples of

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Artocarpus heterophyllus (Jack fruit), Artocarpus hirsutus (Wild jack), and Artocarpus altilis (Bread fruit) extracted with Acetone, Distilled water, Ethanol, Chloroform, Petroleum ether and Benzene against various clinical pathogens like Escherichia coli, Pseudomonas aeruginosa, Salmonella typhi and Bacillus subtilis. The antimicrobial activity study was carried out using agar well diffusion method. The results obtained indicated that both the samples of the selected three species possess a potent anti-bacterial activity against E. coli, P. aeruginosa, S. typhi and B. subtilis using different extracts. Hence the bark and stipule samples of selected species form a potentially good source of antimicrobial agent and demonstrate its importance in medicinal systems as a good functional medicine. Among various species under this genus, the wild jack tree, *Artocarpus hirsutus* Lam. is the only species, hose distribution is constrained to the southern Western Ghats. Also it forms one of the major keystone species of Western Ghats. The tree attains a height of about 45 m and girth up to 4.5 m. It is popular as a valuable timber yielding tree along the Malabar Coast. It is also notable for its valuable medicinal properties. Dry leaves are useful in treating buboes and hydrocele. Fruit constitutes a rich source of carbohydrates, ß-carotene and essential aminoacids. Unripe fruits are useful in vitiated conditions of vata and pitta and anorexia. The ripe fruits posses sour, sweet, cooling, appetizer, constipating and aphrodisiac properties. It causes flatulence, colic, tridosa and rakta vitiations. An infusion of the bark is applied to cure small pimples and cracks on the skin, and the powdered bark is used to heal sores. Bark ash mixed with coconut oil is used externally against 'dhobi's itch' and ringworm. Bark paste in coconut oil lso can be applied for snake bite[12].

Sireesha K *et al*., reported the ethyl acetate seed extract of *A. hirsutus* at different doses was selected and administered orally. The blood glucose levels were estimated by the glucose oxidase method, and insulin levels were measured by chemiluminescence assay method. Antihyperglycemic activity of the test drug in diabetic rats showed a significant reduction in blood glucose levels ($p<0.001$) at 2, 4, 6, and 8 hrs, respectively, as compared to diabetic groups. The antioxidant enzymes SOD and CAT levels were significantly raised, whereas malondialdehyde thiobarbituric acid residue substances levels have decreased ($p<0.001$). The results suggested that *A. hirsutus* seed extract showed a potential antidiabetic activity and antioxidant effect justifying the use of the drug for the treatment of diabetes mellitus and its associated oxidative damage. It is useful in the treatment of anticancer, asthma, antibacterial and in the treatment of various skin diseases[13].

G. P. Bhawane *et al*., reported as the *Artocarpus hirsutus* is a new larval food plant of *A. holosericea*[14]

G. Devi Prasad *et al*., reported as the Grinded bark of *Artocarpus hirsutus lam* is a constituent of the medicine for piles[15], and Grinded bark is smeared on the affected part to cure piles[16]
R. Latha *et al*., reported as the Latex and seed of *Artocarpus hirsutus lam* used for asthma and appetizer respectively[17]

Deepa MR *et al*., reported as the Fruits, Leaves and Bark of *Artocarpus hirsutus lam* are used for Anorexia, small pimples, cracks on the skin and sores[18]

Jim Thomas *et al*., reported as the herbal based medicines are a part of Indian culture. Many plants are widely used based on our ethanobotanical knowledge in curing many disorders. The key advantage of herbal formulations is its low toxicity and side effects. Hence, there is a great demand for phyto-medicines in modern world. The current study prospects the antimicrobial efficacy of the aqueous extract of bark of Artocarpus hirsutus against selected microorganisms namely against *E.coli*, *Pseudomonas aeruginosa* and *Bacillus subtilis*. The aqueous extract was found very significantly inhibiting the E.coli and Pseudomonas even at low concentrations. The phytochemical analysis revealed that the extract possess alkaloids, tannins, Saponins etc which may be attributed to the antimicrobial effect of the extract. The bark of the *Artocarpus hirsutus* is less explored for its bio-potential and hence the work is a preliminary report with significant

Findings of its bio-potential. Roots and bark decoctions are used to cure diarrhoea whereas leaves used along with white camphor and root of curcuma to treat venereal bubones and chronic haemorrhage. Juice of cooked fruits is potential for inducing appetite and applied to the anus, relieve the pains of haemorrhage. Its barks are used to cure diarrhea, pimples and ulcers.[19]

V P Silja *et al*., reported as the Infusion of the bark of *Artocarpus hirsutus lam* is applied to cure small pimples and cracks on the skin[20]

ShymaT.B *et al*., reported as Burn the leaves of *Artocarpus hirsutus*, the ash is taken internally to treat abdominal problems[21]

CONCLUSION

Artocarpus hirsutus (wild jack fruit) is distinctively well known as sources of traditional Medicine, food and industry. Plants are vital for the existence as well as remedies for human diseases because they contain components of therapeutic value. The increasing toxicity and allergic manifestations of the synthetic drugs use of medicinal plants is growing worldwide. Plants are potent biochemical factories and have been components of phytomedicine i.e., any part of the plant may contain active components. investigation of medicinal value of *Artocarpus hirsutus* have added a great deal in the field of phytochemistry with regard to their availability of complex Phytochemical components, antibacterial activity, antihelmentic, anti-inflammatory, antidiabetic, antioxidant, atiulcer and antiviral. There has been growing interest regarding thousands of bioactive compounds that have been produced by this plant species.

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