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A Pharmacological And Medicinal Study Of Areca Palm And Nuts: An Overview.

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ABSTRACT

Areca palm is a perennial evergreen multipurpose tree. It's belonging to Arecaceae Family. The plant possess many medicinal and pharmacological properties it is widely used in ancient times in Ayurveda, Indian system of medicine. It is widely used in India as a addictive substance for chewing purpose after nicotine, alcohol, tobacco in the world. The plant parts (leaves, fruit, root, seed/nut) contains many major bioactive compounds such as poly-phenolic compound, alkaloids (arecoline), flavonoids, tannins, protein, fibre, fats etc. which is beneficial for medicinal value for treat and cure various diseases /disorders such as Diabetes, GI diseases, ulcer preventive, Heart diseases, CNS disorder (Depression, seizures), and also exhibit various pharmacological activities includes anti-inflammatory, anti-protozoal, anti-oxidant, anti-allergic, wound healing activity etc and the extract of areca palm and its nuts also useful for preparation of many natural medicinal and cosmetic products. The main aim of this review was to promote or discover the knowledge about this multipurpose plant and its medicinal importance.

Keywords: - Areca Palm, Areca nut, Pharmacological activity, medicinal use.

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INTRODUCTION

Areca Palm is commonly known as betel palm, catechu tree/palm, supari palm, *Areca catechu* or *Dypsis lutescens* tree etc and the tree fruit/ seed is commonly known as areca nut, betel nut or supari. Areca Palm is a perennial evergreen plant belonging to Arecaceae Family. Areca nut exhibits pleasant aromatic odour, astringent property, psychoactive property and bitter in taste. It is widely distributed in Regions of South Asia, India, china, Bangladesh, Myanmar, Malaysia, Thailand, Vietnam, and Philippines etc. In India, largest production sector of areca nut in the world and it is widely consumed/ used in India. Areca nut is a most addictive substance after nicotine, alcohol, caffeine in the world and it is easily consumed by youngsters/children. Numerous research reports data shown that the many users believe/trust that the consumption of areca nut is useful for the digestion and also possess euphoric (Joyful/excited) effect. In century year ago, Indian and foreign peoples also believed that the nut of the plant is exhibits many medicinal/pharmacological property. In India, areca nut and leaves of the plant is believed as sacred Plant and according to people's faith the ritual fuctions is incomplete without the use of nuts and leaves of the plant is also useful for the decoration purpose.



Figure 1: Areca palm tree with ripe fruits

In past decades According to sushruta samhita religions are wrote that the areca nut possesses a mouth cleansing property, useful for treatment of dental problems, prevent tooth decay (dental caries) and provide strength in jaw, teeth, and voice. The plant is also useful in the treatment of Gastro Intestinal (GI) disorders, act as a anti helminthic/protozoal, useful in the treatment of skin diseases and enhance beauty but the raw/ immature areca nut are may be poisonous and harmful for health and also affected in eyes. The mature/fully ripe nut should be consumed and taken because fully ripe areca nut possess many medicinal property.

The areca nut contains a various major phyto-constituent includes Poly phenolic compounds (Catechin, epicatechin, leucocyanidin), fats, fibre, protein, polysaccharides, alkaloids, tannins, flavonoids, saponins, terpenoids, steroids, etc. The nut of the plant contains a significant alkaloids such as Arecoline, arecaidine, guvacoline, guvacine, isoguvacine, arecolidine, homo-arecoline due to the presence of these alkaloids (arecoline) the plant nut possess Para sympathomimetic activity, it is also used to treat CNS disorders like depression, schizophrenia and possess various pharmacological activity. Arecoline is soluble in water, alcohol, ether but all these bioactive compounds efficacy and potency decreases/reduces after drying process or storing in compare to fresh fully ripe nut of areca palm. According to WHO areca nut possess useful/beneficial effects includes useful for removal of bad taste from mouth, provide strength in gums, jaw, teeth, analgesic and also includes traditional use such as carminative (relieves flatulence), laxative (Increase bowel movement), diuretic, wound healing, ulcer preventive etc. some other uses discussed below.

Numerous researchers studied shown that Areca palm fruit contains many major bioactive constituents due to the presence of these bioactive constituent it is beneficial for treat and cure many disease and possess various pharmacological activity such as:- Anti-inflammatory activity, anti-oxidant property, psychoactive property, wound healing activity, anti-aging and useful for the treatment of various diseases and disorders such as Diabetes, Cardiac diseases, liver diseases, ulcer preventive, tumour, useful in the treatment of hyperlipidaemia, improve sexual behaviour (used as stimulant), CNS disorders like depression, Hypertension

and also used in the treatment of migraine etc. and some other properties exhibits includes act as anti-fungal agent, anti-bacterial, anti-microbial but its daily high amount/dose consumption as a alone chewing, chewing with tobacco or chewed with wrapped inside leaves (paan) may be cause cancer and some other chronic health adverse effect.

Scientific/Botanical description of Areca Palm

Category	Botanical Description
Kingdom	Plantae
Subkingdom	Tracheophytes (vascular plant)
Division	Angiosperm (flowering plant)
Class	Monocots (single cotyledon)
Order	Arecales
Genus	<i>Areca</i>
Family	Areaceae
Species	<i>A. catechu</i>

Vernacular name of areca palm

Languages	Names
Hindi	Supari
Tamil	Kamugu, pakku
Bengali	Supari
Telugu	Pokavakka
English	Betel nut palm, Supari palm, Pinang Palm, areca palm
Malya	Pinang Supari Palm
Canada	Adakka
Sanskrit	Puga, Gubak, Supari, Poogiphalam

Morphological characteristics of Areca Palm and its parts



Figure 2(a): Areca palm unripe fruits, 2(b): Dried areca nut

Plant Parts: - Bark, Leaves, Flower, Fruit

Bark:- Areca palm is a perennial evergreen plant and contain a single/one trunk (main woody stem of plant and distinct its branches), crownshaft. It is long up to 20-30 m and 15-20 cm in diameter/wide.

Leaves: - leaves of the plant are pinnate/ feather like shaped and up to 1.5 m long, conical/pointed tip. Leaves are green in colour and In India it is commonly used in ceremonial functions for decoration purpose etc.

Flower: - Flowers are yellow in colour, unisexual (male or female), group/bunch of inflorescences or flowers. Male flowers are found at inflorescence apex/top and female flower are found at bottom of the inflorescence.

Fruit/ Seed: - Fruit or seed of the areca palm is commonly known as areca nut/betel nut/supari etc. It is solid/dense. The unripe fruit of plant is green in colour and fully ripe fruit is yellowish-orange in colour, ovate shaped and the fruit of the plant contains a fine woody endocarp which surround/cover the seed and the seed/nut colour is brownish with slightly white spot. The taste of the nut is bitter and exhibits astringent , psychoactive property and it also possess many other pharmacological properties.

Important pharmacological/Medicinal property of areca nut

Anti-oxidant Property of areca nut

Numerous researchers Studied shown that the ethanol, methanol extract of the nut of the plant is possesses anti-oxidant activity, free radical scavenging activity. In evaluation of ethanolic extract of nut they shown similar effect to tocopherol (Vitamin E) and shown higher effect than ascorbic acid (Vitamin C) and In another hand the ethanolic extract shown potent free radical scavenging activity using electron spin resonance technique. Due to the presence of some bioactive compounds such as phenolic compounds, flavonoids in methanolic extract of plant the plant shown significant effect against oxidation. Therefore, areca nut is also useful for the production of several natural anti-oxidative agents.

Areca nut possess anti- inflammatory activity

Extract of areca nut is possessing anti-inflammtory effect at is topically applied in inflammation which is useful to inhibit the hyaluronidase (HAase) activity in mice which causes delayed in hypersensitivity/ undesirable reactions using croton oil induced oedema. It is also useful for the production natural anti-inflammatory cosmetic products.

Areca palm possess Wound healing effect

Numerous research studied shown that the plant (nut) extract is useful for healing of wounds, burns, skin surgery and ulcer due to the presence of many major bioactive constituents which it beneficial for wound healing activity such as arecoline, poly-phenol which is responsible for induce the wound healing effect and the extract of nut is useful to enhanced the contraction of wounds, improve tensile strength in granulation tissue. Hence the study shown that the areca nut extract is useful for contraction of wounds and enhanced wound healing effect.

Areca nut possess anti allergic activity

Areca nut extract possess anti-allergic activity. In evaluation of studied shown that the nut possess potent inhibitory effect against antigens which causes degranulation (the process of loosing granules) in mast cell. It is useful in the treatment of several allergic diseases.

Areca nut possess anti-helminthic/anti-parasitic activity

Decoction extract of areca nut contains a arecoline and salts which effective against taeniasis infection (Parasitic infection caused by tapeworm species) and arecoline is effective against several parasitic worm infections such as fasciolopsian cestode, ascariasis, heterales and Rallietina tetragona (parasitic tapeworm) etc. In another studied shown that the Areca plant is useful against tapeworm, round worm and other parasitic worms infection in dogs for veterinary purpose, used as a vermifuge (anti-helminthic medicine).

Anti-aging activity of areca nut

The areca nut possess anti-aging property in both in vitro or in vivo administration of extract. In investigation of studied we found that the extract of areca nut is beneficial for collagen synthesis and enhanced synthesis process, Collagen is essential for skin due to the presence of this beneficial effect the nut is useful for protect against wrinkles in skin and enhanced/ improve skin hydration, improve/enhance skin

elasticity. The nut of plant is useful for the production of anti-aging cosmetic products due to presence of many major phyto-constituents it beneficial for skin such as phenolic compound is useful for the inhibition of elastase which is responsible for skin elasticity and hyaluronidase enzyme. It is present in skin tissue and possess anti-aging effect.

Areca nut possess Memory enhancing and learning activity

In India, areca nut (wet and dry both) is commonly consumed by people after the tobacco and alcohol, nicotine etc. ripe areca nut is dry under sun for 40- 45 days and cure safely after the dried it will be used or chewed. And the wet areca nut is washed before use, In studied found that the both type of areca nut (dry or wet) possess memory enhancing and enhance learning power effect in rat model. The orally administration of extract in rat at dose dependent manner (500mg/kg) body weight. And after 21 days administration of dose rat evaluation we found that increased leaning power and enhance/improve memory.

Areca Palm and Areca nut is useful for treatment of various diseases or disorders

Useful in the treatment of AIDS (HIV)

Areca nut contains a many major bioactive constituents which is beneficial for treat and cure AIDS. Compound such as pro-cyanidins, tannins. The seed extract of this plant possess inhibitory effect against HIV protease (act as HIV Protease inhibitor).

Useful in the treatment of Gastro Intestinal (GI) disorders

Areca nut possess significant effect/activity against digestive/GI disorders and beneficial in food metabolism process. The extract of areca nut is useful for reducing the cholesterol level by inhibiting the acetyl co enzyme acyl transferase (ACAT) in intestine and also inhibit the pancreatic cholesterol esterase results shown reducing the absorption of cholesterol (possess anti hyperlipidaemia effect). According to many survey data/reports shown that chewing areca nut is useful for the metabolism of food, possess anti diarrhoeal effect etc.

Useful in the treatment of diabetes

Areca nut extract is used in the treatment of diabetes because it contains a major alkaloids like arecoline which is responsible for hypoglycaemic effect. In evaluation of studied shown that the extract of areca nut possess hypoglycaemic effect at lower dose (0.05-0.25 mg/kg) body weigh in diabetic animal. Extract of nut is possess a α -glucosidase inhibitory activity and useful for prevent/arrest the formation of high glucose level in blood.

Useful in the treatment of Cardiac Disorders

The water, ethanolic, acetic acid, calcium hydroxide extract of areca nut possess capillary shrinking/contraction effect and areca nut contains many major bioactive constituent such as Arecoline (alkaloid). It is administered and effective by both routes subcutaneous (SC) and intravenous (IV) and it is useful in the treatment of cardiac depression.

Useful in the treatment of hypertension/High blood pressure

Arecanut extract is useful in the treatment of hypertension (High blood pressure). it's a potent angiotensin-converting enzyme (ACE) inhibitor and inhibiting the activity of ACE causes lower the blood pressure and relax arteries and veins. In orally administration of extract of areca nut at tolerable dose (100 mg/kg, 200mg/kg) shown anti-hypertensive activity in rats. The areca nut dose (100 mg/kg, 200mg/kg) were compare to captopril (ACE Inhibitor) dose (30mg/kg, 100 mg/kg) shown similar effect.

Areca nut is useful for umbilical vascular relaxation

Nut of the plant possess vascular relaxation property and arecoline (bioactive alkaloids) possess relaxation effect in umbilical arteries, veins at a sufficient/tolerable amount of dose conc. and study found that the arecoline gives in higher conc. that possess significant effect of relaxation but the relaxation effect is reduced after the removal of endothelium. Arecoline exhibits some another property includes it is useful for the higher the level of cGMP in Umbilical arties (blood) at tolerable dose conc. manner (increased level of cGMP causes vasodilation/vascular relaxation).

Useful in the treatment of Eye diseases

In ancient time, the people also used the plant and its parts due to the presence of various medicinal property and one is most common property such as miotic effect (constrict the pupils). In recent data found that the plant possess alkaloids (arecoline) which is effective/responsible for the miotic effect of plant. It is useful for the preparation of eye drops, eye lotion.

The eye lotion is apply on the eyes which causes constriction of pupils same as atropine. In another study found that the fine powder of ignite nut of plant is used in as a collyrium (eyewash) used to prevent redness of eyes, eye discharge and prevent other inflammation etc.

Ulcer preventive

Areca nut id useful in the treatment of ulcer its possess ulcer preventive property at 250mg/kg body wt. dose dependent manner. Numerous researchers studied shown that the plant is useful to prevent the initiation/formation of alcohol induced gastric mucosal malondialdehyde (MDA) because Higher the MDA level which causes infected the gastric mucosa and the plant scraped nut extract is applied externally is also used to prevent ulcers.

Useful for the treatment of hypercholesterolemia

Numerous research reports shown that the extract of areca nut possesses hypocholesterolemic effect using rat model. Extract of areca nut is useful to reduce the level of triglycerides (fat/lipid in blood) and conc. of plasma lipid in rats and results reduced level of cholesterol.

Useful for the treatment of CNS Disorders (depression, convulsions/ seizure)

Areca nut extract is also useful in the treatment of depression and convulsion due to the presence of major bioactive constituent in nut such as a Arecaidine, guvacine etc. these bioactive constituent of nut possess anti-convulsant activity and inhibits the uptake of Gamma aminobutyric acid (GABA) and α -alanine.

In another studied found that the ethanolic extract of areca nut shown anti-depressant activity in rodents. And the ethanolic extract of nut administered at dose (4 to 80 mg/kg) which causes a decreased a immobility time without effecting the motor activity by using a swimming and tail suspension test in rodents (rat).

Useful for the prevention of destruction of red blood cells (erythrocyte haemolysis)

According to scholars studied were found areca nut ethanolic extract is useful for the prevention of erythrocyte haemolysis by inhibiting the increased level of H_2O_2 in rats models (using Young and old both rats).

Other Activities of Areca nut

In ancient times, the plant or its parts is also used in ayurvedic system of medicine, Indian system and traditional for its medicinal/pharmacological property but the plant also possess some other activities such as antibacterial activity, anti-fungal activity, anti-microbial activity etc. In Ayurveda the seed (nut) of the plant with turmeric is used as a tooth cleaning agent (tooth cleaner). Discussed in below:-

Anti-fungal activity of Areca nut: - Numerous researchers studied shown that the nut/seed of the areca palm aqueous and hydro-alcoholic, hexane, ethyl acetate extract possess antifungal effect.

In evaluation of studied they shown the areca nut aqueous extract (50µg/ml) is useful against unicellular/Single-cell fungi and inhibit the growth of the fungi includes *Candida albicans* (fungal pathogen). It is also useful for inhibitory activity against some fungus like *Mucor sp*, *Cladosporium sp* and *Aspergillus niger*. This aqueous extract is also effective against growth of aflatoxin (poisonous carcinogen) And In other hand the areca nut hydro-alcoholic extract (100mg/ml) possess average/moderate effect against fungus but at 200mg/ml conc. of hydro-alcoholic extract possess vital/strong activity against fungus (*Candida albicans*). Ethyl acetate extract of areca nut was more effective against *C.albicans* compare to the aqueous extract. Hexane extract of areca nut slightly/less effective against fungus. Hence the study proved that the areca nut extract possess anti-fungal activity.

In other study shown that the not only nut/seed plant root and seed or fruit outer covering (pericarp/shell) also possess antifungal activity. In evaluation of study, the areca nut shell (outer covering) alcoholic extract possess anti-fungal/inhibitory activity against some unicellular fungus like (*C albicans*). And the ethanolic root extract of the plant shown a potent antifungal activity and a useful for the inhibition of various fungus like *C. albicans*, *A. niger*, *A. flavus* and *Penicillium notatum* Thus, the plant also useful for the production of anti-fungal agents.

Anti-bacterial property of Areca nut (for oral pathogens/bacteria):- In past few years, Many scholars studied shown that the areca nut possess anti-bacterial activity against many oral pathogens because numerous survey/data shown that the nut of the plant possess many beneficial bioactive constituents which is useful/protect against dental problem/oral pathogens. compounds such as Tannic acid these compound possess cariostatic property (inhibit the formation of dental caries) Due to the presence of these compound the consumption/ chewing of areca nut is effective against dental caries (decay of tooth).

In another study shown that due to the presence of bioactive compound (tannic acid) the extract of nut exhibits inhibitory effect against the growth of several bacterial such as *Eikenella corrodens*, *Porphyromonas gingivalis*, *Campylobacter rectus*, *Tannerella forsythensis* etc. Hence, the study proved that the extract of areca nut possess anti- bacterial activity.

Anti-microbial effect of areca nut:- Areca Palm Seed/nut contains many major phyto-chemical compounds such as phenolic compounds, flavonoids due to the presence of several poly-phenolic compounds the nut is useful against several micro-organism such as *Escherichia coli (E.coli)*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Vibro cholera*, *Salmonella typhi* etc and inhibit the growth of these bacteria. Some other compounds present in areca nut such as catechol, epi-catechol, tannins, pro-anthocyanin may be presence of these compound it is effective for anti-microbial activity against several microbes.

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