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A PHYTOPHARMACOLOGICAL REVIEW ON THERAPEUTIC POTENTIAL OF *ARECA CATECHU*

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Abstract:

Arecha catechu belongs to the palm family. It is commonly known as betel nut. Arecha catechu has capability of increasing the nervous activity in the body. Areca nut has several bioactivities such as Antioxidant activity, Hypoglycaemic activity, Hypolipidemic activity, Antihypertensive activity, Anti depression activity and Anticoagulant activity. The nut of this plant consists of various chemical constituents like alkaloids, tannins, arecoline, arecadine and fibres. Arecoline and Guvacoline are the different carboxylic acids isolated from the plant. In general the nut of Areca catechu is widely used by the people for the purpose of chewing as a habit. It may leads to addiction and it is also one of the causes of oral cancer. The Ethanolic extract of areca nut has potent antioxidant activity. Areca nut also has potent invitro inhibitory activity on angiotensin converting enzyme.

Keywords: *Areca catechu, Betel nut, Areca nut*

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INTRODUCTION:

Plants are the important source for the investigation of new products of medicinal value for drug development. Now a several distinct chemicals derived from plants are important drugs used in one or more countries in the world. Plants have the ability to synthesize chemical compounds that help them to defend against attack from a wide variety of predators such as insects, fungi and herbivorous mammals. Those compounds are generally known as secondary metabolites and which are mainly responsible for various pharmacological activities of the plant. *Areca catechu* belongs to the genus Arecaceae and it was first described by Linnaeus [1, 2]. It is the primary source of betel nut. The betel nut raises the levels of nervous activity in the body. It is regarded as the fourth most widely used addictive substance after caffeine, nicotine and alcohol [3]. *Areca catechu* is a species of palm which grows in regions near to pacific Asia, and various parts of east Africa. The palm has primarily originated in the Philippines [4]. The frequent usage of Areca nut in India was referred in Sanskrit medical literature and also in the Hindu and Buddhist writings. The usage of betel nut, as a masticator by humans has been known since from the 4th century AD in different parts of the world. Arecanut has importance in religious, social and cultural functions in India. The betel nut is present in the ceremonial plate, as humans believe that the betel nuts having a property to increase the prosperity. The nut is offered to the guests, along with a betel leaf, as a mark of respect. In India the chewing of betel quid, which includes betel leaf, areca nut and lime, is practised at least 2,000 years old, where as the tobacco was introduced around the sixteenth century [5].

The various pharmacological investigations have stated that the Areca nut has several bioactivities such as anti-parasitic activity [6], digestive effect [7, 8], anti-depressive activity [9], anti-oxidant activity [10], anti-bacterial activity [11], anti-inflammatory and anti-analgesic activity [12]. Most of the drugs used today are simple synthetic modifications or copies of the naturally obtained Substances [13]. The present review of *Areca* catechu describes the different phyto pharmacological activities and the complete profile of the plant.

PLANT PROFILE:

Synonyms:

The synonyms of *Areca catechu* are *Areca faufel Gaertn, Areca hortensis Lour, Areca catechu Burm.f. Sublimia, Areca comm. Ex Mart* [14]. The various common names of the plant are areca palm, areca nut palm, betel palm, Indian nut pinang palm [15].

Scientific Classification:

Kingdom	:	Plantae
Clade	:	Tracheophytes
Clade	:	Angiosperms
Clade	:	Monocots
Clade	:	Commelinids
Order	:	Arecales
Family	:	Arecaceae
Genus	:	Areca
Species	:	*Areca catechu*

Figure 1: *Areca catechu* Plant**Plant Description**

Areca nut is the seed or endosperm (nut) of *Areca catechu* Linn. Areca catechu is a slender, single-trunked and monoecious palm with a prominent crown shaft. According to old Indian scripts, such as Bhavamista (13th century) and Vagbhata (4th century), betel nut has been described as a therapeutic agent for the treatment of leukoderma, leprosy, anaemia and obesity. It is also has de-worming properties and hence used as vermifuge.

The habit of Areca species is different from undergrowth palm lets to moderately robust tree palms and from solitary to clustering [16, 17]. All species in East Malaysia are solitary, except for *Areca vestiaria* but some populations of *Areca vestiaria* are single stemmed. Two Areca species in the region have stilt roots, namely *Areca novohibernica* and *Areca vestiaria.* The stilt roots are related to swampy habitats, light environments or stabilization in rocky habitats. These roots are essential for getting mechanical support and vascular function [18, 19]. Areca nut palm (*Areca catechu* L.) is cultivated mainly for its highly valuable kernel, which was obtained from the fruit. The fruit is chewed in its tender, ripe or processed form.

CHEMICAL CONSTITUENTS:
The major chemical constituents of *Areca catechu* are polyphenolic compounds, alkaloids, tannin, arecoline, arecadine and fibres [20, 21]. Arecoline and Guvacoline are the different carboxylic acids isolated from the plant [22]. Caine is the active principle of the Areca nut. Aqueous extract of the betel nut contains, catechu, 15 % of tannin, gallic acid, 14% of fat, gum and alkaloids, namely 0.07% of Arecoline, 1% of Arecaine, arecaidine and guvacoline. Guvacine and choline occur in traces only. All these alkaloids are chemically related to each other. Arecoline is colourless volatile and resembling nicotine [23].

USES:
In Some Asian countries such as china, Philippines, Malaysia, Myanmar, Taiwan, Vietnam and India the Areca nut is popularly used for regular chewing. Chewing areca nut is popular among working classes in Taiwan. The nut induces addiction and is the major cause of oral cancer [24]. Areca nuts in Taiwan will usually contain artificial additives like limestone powder [25].

The areca palm is also used as an interior landscaping species. It is frequently used in large indoor areas such as malls and hotels. In India the dry, fallen leaves of the plant are collected and hot-pressed into disposable palm leaf plates and bowls [26].

PHARMACOLOGICAL ACTIONS:
Antioxidant activity:
The Ethanolic extract of areca nut shown to have the characteristic and potent anti-oxidant, free radical scavenging and Anti-hyaluronidase activity. But the Antioxidative effect of the seed extract was lower than the butylated hydroxy toluene, and as same as the tocopherol and was higher than ascorbic acid [27].

Hypoglycaemic Activity:
It was investigated and reported that arecoline have hypoglycaemic activity in an animal model of diabetes upon subcutaneous administration. In alloxanized rabbits (140 mg/kg), the subcutaneous administration of alkaloid fraction of Areca catechu (0.05 to 0.5 mg/kg) shows significant hypoglycaemic effect lasting for 4 to 6 hours [28]. But it was also observed that chronic usage of the nut is associated with higher risk of type 2 diabetes mellitus and metabolic syndrome, which was determined by a epidemiologic survey in Taiwan [29, 30].

Hypolipidemic activity:
The extract of Areca also identified to exhibit a strong inhibitory activity on cholesterol absorption in high cholesterol fed rats. In another study, a diet containing corn oil with areca nut extract supplement are fed to the rats effectively lowered the absorption of triglyceride and the plasma lipid concentration [31].

It has been found that areca nut extracts exhibit in-vitro strong inhibitory activities against pancreatic cholesterol esterase (PCEase) and also found to lower the absorption of dietary cholesterol ester [32]. Furthermore, both absorption of intestinal free cholesterol and small intestinal PCEase activity were significantly lowered when fed with a diet containing free cholesterol with areca nut extract supplement [33].

Antihypertensive activity:
Areca nut reported to have potent in vitro inhibitory activity on angiotensin-converting enzyme (ACE). Intravenous administration of areca nut fraction to SHR produced a rapid and marked reduction in blood pressure at doses of 10 and 15 mg/kg. The maximum antihypertensive effect of areca nut fraction at an I.V. dose of 15 mg/kg, was about 5 times as large as that of captopril at the same dose [34].

Antidepressant Activity:
The areca nut fraction potentially inhibits monoamine oxidase-A activity and thus restores or increases bioavailability of monoamines, 5-hydroxytryptamine or noradrenaline in the brain. Additional to this, forced swimming and tail-suspension tests supported that the dichloromethane fraction has antidepressant activity [35].

Anticonvulsant Activity:
Arecaidine and guvacine inhibits the uptake of GABA and alpha-alanine. Large doses of arecaidine (1 g/kg subcutaneous) marginally reduces the lethal effects of bicuculline in mice but appeared to have little or no anticonvulsant activity [36].

DISCUSSION AND CONCLUSION:
Areca catechu raise the levels of nervous activity in the body regarded as the fourth most widely used addictive substance after caffeine, nicotine and alcohol. Modern pharmacological investigations have commutated that areca nut possesses, several bioactivities such as anti-parasitic effect, digestive effect, anti-depressive effect, anti-oxidant effect, anti-bacterial effect, anti-inflammatory and anti-analgesic effects. Aqueous extract of areca nut contain catechu, tannin 15%, gallic acid, oily matter (fat 14%), gum and alkaloids like Arecoline 0.07%, Arecaine 1%, arecaidine and guvacoline, guvacine and choline occur in trace only.

The extract of Areca catechu may be addictive. Ethanolic extract of areca nut have the following activities like anti-oxidative, free radical scavenging and Anti-hyaluronidase activity. It was investigated and reported that arecoline have hypoglycaemic activity in an animal model of diabetes upon subcutaneous administration. Areca extracts are also identified to exhibit a strong inhibitory activity on cholesterol absorption in high cholesterol fed rats. Areca nut fraction reported to have potent in vitro inhibitory activity on angiotensin-converting enzyme.

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