

Review Article

Adverse effects on health posed by consumption of Areca nut (*Areca catechu* L., family: Palmaceae)

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ABSTRACT

This review paper discusses the impact of areca nut (Betel nut) on human health. Small pieces of betel nut are generally use with betel leaf after meals in a day or on any festival. Areca nut seed contains bioactive components like alkaloids and tannins. It is known as salivary stimulating, digestive agents and act as antimicrobial effect against oral bacteria. Along with the few beneficial effects, it has some adverse effects on the human body. Need to enhance the awareness activities regarding the health concern due to consumption of areca nut.

Keywords: Betel nut, Medicinal value, Health hazard, South East Asia

INTRODUCTION

The areca nut is the seed of the areca palm (*Areca catechu* L. Family: Palmaceae), that is commonly used with betel leaves. The habit of chewing betel nut is thought to have originated in South East Asia, most probably in Malaysia.¹ The areca tree is widely cultivated in tropical India, Bangladesh, Japan, Sri Lanka, South China, the East Indies, the Philippines and parts of Africa. The tropical palm trees bear fruit all year. The nut may be used fresh, dried, or cured by boiling, baking, or roasting. Betel nut's medicinal use is limited, and long-term negative reactions to betel quid chewing are well known.² Many South Asian women from rural areas regularly chew betel quid, a combination of areca nut, betel leaf and lime paste with tobacco leaf. The quid changes the teeth to turn black brown and stain the tongue and oral mucosa. It is estimated that 10% to 20% of the world's population chews betel quid.^{3,4} A mixture of betel quid, areca nut and tobacco chewing or snuffing is unsafe for oral health.⁵ In rural India, the consumption

of betel nut with betel leaf is a common practice. It contains several medicinally active substances.⁶

CONSTITUENTS OF ARECA NUT

Areca nut primarily consists of alkaloids like arecoline, arecaidine, guvacine and guvacoline.⁷⁻⁹ The major constituents of the nut are carbohydrates, fats, proteins, crude fibre, polyphenols (flavonols and tannins), alkaloids and mineral matter.¹⁰ Polyphenols (flavonols, tannins) constitute a large proportion of the dry weight of the nut and are responsible for the astringent taste of the nut. It contain at least 9 structurally related pyridine alkaloids including arecoline, arecaidine, arecaine, arecolidine, guvacine, isoguvacine, guvacoline, and coniine. They are the most important biologically and have a stimulating effect.¹¹ The chemical composition of areca nut has been reported in many studies.^{12,13} The concentrations of various constituents vary between raw and ripe areca nuts.¹³ Areca nut also contains sodium, magnesium, calcium, vanadium, manganese and copper.¹⁴

HEALTH BENEFITS

Areca nut contains bioactive components like alkaloids and tannins which have been demonstrated to elicit inhibitory effects in selected microorganisms.¹⁵ Areca nut is used against anaemia, fits, leucoderma, leprosy, obesity and worms. In combination with other ingredients, it is also a purgative and an ointment for nasal ulcers. Kernels of green and mature fruits are chewed as an astringent and stimulant, often with the leaves of *Piper betle* and lime.¹⁶ Areca nuts are chewed with betel leaf for their effects as a mild central nervous system stimulant.¹⁷ The effect is thought due to one of its content known as arecoline that leads to alertness, increased stamina, a sense of well-being and euphoria. It is known to stimulate salivation and thus aiding in digestion.¹⁸ According to traditional Ayurvedic medicine, chewing areca nut is a good remedy for deworming and along with betel leaf it prevents halitosis.⁷ It has also been reported that areca nut extract exerts a direct antimicrobial effect against oral bacteria, including *Streptococcus mutans*, *Streptococcus salivarius*, *Candida albicans* and *Fusiform nucleatum*. Tannic acid concentrations varying from 1.8-18 mg/ml inhibited growth of *E. corrodens*, *Prophyromonas gingivalis*, *C. rectus* and *Fusiform nucleatum*.¹⁹ Areca was touted as a medicine for digestive and dental health. It was used to facilitate bowel movements and reduce intestinal worms.²⁰

HEALTH HAZARD

Epidemiologic studies of oral cancer show strong associations with the consumption of betel nut, alcohol, tobacco and cigarette smoking.^{21,25} In Taiwan, approximately 85% of oral cancer patients habitually use betel nut.²⁴ The consumption habits of these substances might only be associated with the early stages of oral cancer development, while the later stages of cancer progression may be more closely associated with other external factors.²⁶ Chewing areca nut is thought to have central nervous system stimulating effect and along with this it is known to have salivary stimulating and digestive properties. Along with the beneficial effects of areca nut one of its most harmful effects on the human body in general and oral cavity; in particular is the development of potentially malignant disorder called Oral Sub mucous Fibrosis. The alkaloid and flavonoid content of the areca nut plays a very important role in the major events that occur in pathogenesis of OSF which has a high potential of tuning into malignancy. So, need to promote the awareness regarding the oral health due to consumption of areca nut and its commercial products.^{18,27} Although the pathogenesis of disease is thought to be multifactorial, chewing of betel quid or areca nut has been recognized as one of the most significant risk factors for OSF.²⁸ The general effects of chewing areca nut have much impact not just on the oral cavity but also on the general health of an individual. However, many a times, the deleterious effects can outweigh the general effects to a large extent when it becomes a habit.²⁹

Chewing betel quid with areca nut as one of its components has been associated with oral mucosal lesions like oral sub mucous fibrosis and oral leukoplakia, which has the potential for malignant transformation.^{30,31} In spite of being aware of risk of having multiple health problems, a major proportion of respondents were using betel quid, areca nut, tobacco and alcohol.³² The increasing use of tobacco with areca nut has played a significant role in the increased incidence of adverse health effects in many countries of the Western Pacific Region.³³ Moreover, the areca-nut can be correlated with an increased incidence of cancer. Like tobacco, chewing the areca-nut also leads to oral and oropharyngeal cancers.³⁴ Betel Nut (BN) or Areca Nut (AN) chewing habits on its own or with other ingredients including chewing tobacco are highly prevalent in many South East Asian countries. The major alkaloid arecoline in the BN has been found to be carcinogenic and to be associated with a range of health risks, including negative effects on pregnancy prevention. Pregnancy imposes stress on folate stores because of increased requirements for growth of maternal tissues, fetus, and placenta. Folate deficiency during pregnancy is a major public health concern as is associated with many adverse health outcomes including neural tube defects, low birth weight, preterm birth, and delayed maturation of the nervous system, growth retardation, and megaloblastic anemia.³⁵ Several polyphenols in betel nut have been shown to be genotoxic probably by formation of Reactive Oxygen Species (ROS) in the chewer's saliva. ROS causes oxidative stress or oxidative degradation where the cell is unable to counterbalance. ROS can cause many harmful effects such as oxidative and chromosomal damage of DNA, which could be involved in several stages of the carcinogenic process in oral mucosa.^{36,37} Some studies found that use of betel nut was associated with thiamine deficiency,^{38,39} aggravated effects of vitamin-D deficiency⁴⁰ and was associated with central obesity, hyperglycemia, diabetes mellitus^{41,42} cirrhosis⁴³ and goiter.⁴⁴ Various studies have shown that betel nut use during pregnancy has adverse effect on birth outcomes, including low birth weight, shorter birth length, and preterm delivery.^{45,46} Harmful effects of BN have been observed in experimental studies on human embryos and pregnant women.⁴⁷⁻⁴⁹

CONCLUSION

Betel nut use is popular in India, Bangladesh, Sri Lanka, Myanmar, Maldives, Taiwan, Thailand, Malaysia, Indonesia, China, Philippines, Vietnam, Cambodia and Laos. Betel nut is an important agricultural product in these countries.^{50,51} The majority of the users are unaware of the harmful effects of areca nut consumptions.³⁴ Efforts should be taken to increase awareness regarding the health risks of areca nut uses among the general people to discourage such habits.

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