

## Prevalence of Areca Nut Chewing Among Rural Population in India

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### ABSTRACT

**Objective:** To investigate the frequency of usage of areca nut among rural population and to mark the deleterious effects on health among the areca nut chewers.

**Methods:** The concern studies have glared the deleterious effect of chewing areca nut on oral health. Data was collected with the pre-structured questionnaire among 707 study participants. Chi square test of significance was used for data analysis.

**Results:** Among the study participants 67.01% have the habit of chewing betel leaf with areca nut along with other constituents. This is nearly of about areca nut chewers, i.e., 32.99%. The study illustrates the strong association between the habit of chewing areca nut/betel leaf/areca nut with other constituents and with the development of oral lesion. Areca nut chewers (3.28%) have more pervasiveness over the combination of betel leaf, areca nut with other constituents (2.69%) in the age group of less than 25 years.

**Conclusion:** Areca nut and its compounds have deleterious effect on oral mucosa. Strict prohibition should be implemented to inhibit the ease of availability. Health warnings should be highlighted with the legal prohibition to turn down the spread of oral lesion.

**Keywords:** Areca nut, Betel leaf, Oral lesion, Rural population

### INTRODUCTION

Areca nut is the seed of the fruit of the oriental palm, *Areca catechu*. It is the basic ingredient of a variety of widely used chewed products. Thin slices of the nut, either natural or processed, may be mixed with a variety of substances including slaked lime (calcium hydroxide) and spices such as cardamom, coconut and saffron. Most significantly, they may be mixed with tobacco products or wrapped in the leaf of the piper betel plant. Hence the more common name betel nut. Use of the term 'betel nut' is not botanically correct; it has caused considerable confusion in the scientific literature and should be avoided. Areca nut is used by an estimated 200-400 million people, mainly Indo-Asians and Chinese [1]. Areca nut is known colloquially in Hindi and other languages in India as supari.

Quid is a substance or mixture of substances (in any manufactured or processed form) that is placed in the mouth, where it is sucked or actively chewed and thus remains in contact with the mucosa over an extended period. It usually contains one or both of 2 basic ingredients, tobacco and areca nut [2]. The composition of betel quid, also known as paan, varies between communities and individuals, although the *major constituents* are *areca nut* and *slaked lime* (from limestone or coral) *wrapped within a betel leaf*. The paan is placed between the teeth and the buccal mucosa and is gently chewed or sucked over a period of several hours

[2,3]. The slaked lime acts to release an alkaloid from the areca nut, which produces a feeling of euphoria and well-being [4]. Other substances of local preference may be added, such as grated coconut or a variety of spices, for example, aniseed, peppermint, cardamom and cloves [5]. Ingredients of *paan* (sliced areca nut wrapped in betel leaf) are added according to personal preferences. In addition, the lime has been shown to release reactive oxygen species from extracts of areca nut, which might contribute to the cytogenetic damage involved in oral cancer. Variants of *pan* include use of sliced areca nut alone and addition of sweeteners to make the product particularly attractive to buyer, to whom it is sold under the name *sweet supari*, *gua*, *mawa* or *mistee pan* [3,6].

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It is used by men and women—in some societies the latter predominate. All age groups and social classes use the product. Areca nut has a long history of use and is deeply ingrained in many sociocultural and religious activities [7].

Arecoline has been isolated from the basic nut [8] and has major effects on various neurotransmitters particularly on cholinergic neurones, but there are a variety of other alkaloids—namely, arecaidine, guracine, guacine and arecolidine, as well as unidentified peaks on chromatography of the extracts.

Chewing areca nut on a habitual basis is known to be deleterious to human health [9]. A growing body of evidence over the last 40 years, mainly in the form of large-scale epidemiological and experimental studies, has shown that even when consumed in the absence of tobacco or lime areca may have potentially harmful effects on the oral cavity. The study upholds the deleterious effect of chewing areca nut on oral health.

**MATERIALS AND METHODS**

The present cross-sectional study was conducted among the rural population. Villages 50-60 km away from New Delhi are included in the study. The study was conducted from January to June 2018. Purposive sampling was adopted for choosing the rural population, as some cultural customs are prevalent among the specific group of population. The

villagers were informed about the health check camps for next few days. This was done to engulf the maximum number of populations in the concern study. Total 707 people attended people attended the camp and accounted for the sample size. Total of 15-20 individuals were interviewed daily on basis of pre-structured and pre-designed questionnaire by the principal investigator. The individuals with clinical lesions were than stained with Toludine blue (colorizing agent) and acetic acid (decolorizing agent) with appropriate aseptic technique for diagnosing the cases of oral lesion. Data was collected with the pre-structured questionnaire including the habit of consumption of areca nut and its different compounds.

**RESULTS**

Friends and family may be among the first to recognize the Betel leaf, areca nut chewers with other components (like tobacco, slake-lime, etc.) and Areca nut chewers with other flavonoids are smokeless form of tobacco. They are prevalent among villagers as areca nut chewers and betel leaf chewers are not easily noticed. Total village population examined 67.01% have the habit of chewing areca nut with betel leaf or with any other flavonoids.

Areca nut is cut from areca nut cutter and it is chewed accordingly, 32% of the study participants chew areca nut with other flavonoids. The study shows ease of availability of areca nut and its different forms (Table 1).

**Table 1.** Availability of areca nut and its different forms.

Age in years (n=707)	Betel leaf, areca nut chewers with other components (like tobacco, slake lime, etc.)	Areca nut chewers with other flavonoids	Non-chewers	Total (%)
<25	19 (2.68%)	27 (2.85%)	31 (4.38%)	77 (10.87%)
≥ 25 to <30	42 (5.94%)	36 (4.95%)	38 (5.37%)	116 (16.42%)
≥ 30 to <35	57 (8.06 %)	46 (6.51%)	43 (6.08%)	146 (20.62%)
≥ 35 to <40	75 (10.61%)	25 (3.54%)	45 (6.36%)	145 (20.48%)
≥ 40 to <45	69 (9.62%)	10 (1.41%)	37 (5.23%)	116 (16.38%)
≥ 45 to <50	37 (5.23%)	08 (1.13%)	20 (2.83%)	57 (8.05%)
≥ 50	27 (3.82%)	09 (1.27%)	08(1.13%)	44 (6.21%)
<b>Gender (n=708)</b>				
Male	232(32.76%)	157 (22.17%)	165 (23.31%)	554 (78.25%)
Female	93 (13.13%)	3 (0.42%)	57 (8.05%)	153 (21.61%)

Study participants in the age range 30-40 years have the habit of chewing areca nut with or without betel leaf. This may be due to cultural and social acceptance or may be due to peer group involvement in the habit of chewing. Social

gathering offer arecanut with or without betel leaf as a mark or token of greet.

The study submits the male predilection for the habit of chewing areca nut in any form. It was observed (3.6:1) among total populations. The younger population is

consuming more areca nut with other flavonoids as compare to the chewing habit of betel leaf in combination with areca nut, slake-lime and other compounds. This may be the crude cause of mortality due to complications of premalignant lesions among youngsters. There may be possibility of easy availability, at a low price, with good fragrance that the

younger generation is fond of areca nut related compounds. Khandelwal et al. have illustrated the early usage of areca-nut among adolescents.

Oral lesion keratosis accounted at 67.58% and 8.05% among betel leaf, areca nut composition chewers and areca nut chewers with other flavonoids (Table 2).

**Table 2.** Oral lesion keratosis among betel leaf, areca nut composition chewers with other flavonoids.

Oral Lesion	Leucoplakia	Keratosis	OSMF	Keratosis + OSMF	Keratosis + Leucoplakia	Leucoplakia + OSMF	Total (%)
<b>Duration in years</b>							
Betel leaf, areca nut chewers with other components	n=293						
≥ 1 to <5	8 (11.94%)	58 (86.57%)	1 (1.49%)	0	0	0	67 (100)
≥ 5 to <10	19 (31.66%)	40 (66.67%)	1 (1.67%)	0	0	0	60 (100)
≥ 10 to <15	12 (19.67%)	49 (80.33%)	0	0	0	0	61 (100)
≥ 15 to <20	13 (39.39%)	20 (60.61%)	0	0	0	0	33 (100)
≥ 20	40 (55.56%)	31 (43.05%)	1 (1.40%)	0	0	0	72 (100)
Total	92 (31.39%)	198 (67.58%)	3 (1.02%)	0	0	0	293
Areca nut chewers with other flavonoids	n=149						
<b>Duration in years</b>							
≥ 1 to <5	9 (10.35%)	11 (12.65%)	43 (49.42%)	8 (9.10)	1 (1.16)	15 (17.24%)	87 (100)
≥ 5 to <10	4 (9.30%)	1 (2.32%)	18 (41.86%)	10 (23.26%)	0	10 (23.26)	43 (100)
≥ 10 to <15	0	0	10 (71.44%)	2 (14.28%)	0	2 (14.28)	14 (100)
≥ 15 to <20	0	0	2 (50.0%)	1 (25%)	0	1 (25%)	4 (100)
≥ 20	0	0	0	1 (100%)	0	0	1 (100)
Total	13	12 (8.05%)	73 (49%)	22 (14.77%)	1 (0.67)	28 (18.79)	
Non chewers		6 (60%)	1 (10%)	0		0	

Maximum of 86.5% of areca nut in betel leaf chewers with other components had the keratosis lesion within five years. (Table 2). Prevalence of OSMF among the villagers with the habit of chewing betel leaf along with areca nut and another components population was estimated at 18.89%.

Areca nut with other flavonoids chewers has demonstrated the maximum OSMF 49% (Table 2). The overall prevalence of leucoplakia in the present study is estimated at 15.27%.

This premalignant condition was observed in 31.40% and 8.72% among combination of areca nut, betel leaf with other components and areca nut with other flavonoids, respectively (Table 2).

The association between Areca nut chewers with other flavonoids, betel leaf (combination with areca nut and other components) and non-chewers with respect to development of oral lesion was highly significant (Table 3).

**Table 3.** Association between areca nut chewers and non-chewers with respect to development of oral lesion.

	Oral lesion present (%)	Oral lesion absent (%)	Total (%)	P value
Areca nut chewers with other flavonoids	149 (21.08%)	11 (1.55%)	160 (22.63%)	P<0.000 1
betel leaf, areca nut chewers with other components	293 (41.44%)	32 (4.53%)	325 (45.97%)	P<0.000 1
Non-chewers	10	212 (29%)	222 (31.4%)	P<0.000 1
Total	452	255	707 (100)	

**DISCUSSION**

Areca nut is the fourth most commonly used substance of abuse in the world after tobacco, alcohol and caffeine. Areca nut is psychoactive substance used by millions of people in India and world-wide [10]. Areca nut is easily accessible among the villagers; it is cost effective and least noticed.

Studies have confirmed the addictive ingredients in areca nut [11]. Arecoline is a main carcinogenic component in areca nut [12]. There is good evidence that supports the role of areca nut chewing enhance the risk of OSMF. Studies have illustrated that alkaloids from areca nut such as arecoline and its hydrolysed product arecaidine may stimulate cultured fibroblasts to proliferate and synthesize collagen [13,14]. In addition flavonoids within the nut have also been shown to increase the stabilization of collagen by enhancing the cross-linking of collagen, thereby increasing the resistance to degradation by collagenases [15]. Furthermore, recent studies have shown that arecoline inhibits collagen synthesis and fibroblast proliferation *in vitro*, suggesting that arecoline may have cytotoxic properties [16-18].

Chewing areca nut with betel leaf is very prevalent among the study participants. The pan is sucked or chewed which provide the addictive feeling of euphoria. The data suggest that the habit of chewing betel leaf with areca nut increases the risk of developing oral lesion [19].

Areca nut with betel leaf (pan) chewing without tobacco causes oral cancer have been highlighted in a few recent studies. According to Van Wyk et al. [20], 68% of cheek

cancers and 84% of tongue cancers were found in subjects consuming areca without tobacco. Furthermore, there is new evidence which suggest that areca in the absence of tobacco may be an independent risk factor for the development of oral cancer [21].

Chewing habitual areca nut leads incisal and cuspal grinding of the teeth with leads to the loss of enamel and exposure of underlying dentine. There may be high incidence of root fracture due to increase masticatory force among areca nut chewers [22].

Studies have suggested that areca nut chewers have less feasibility of dental caries as compare to the non-chewers [23-25]. Stains among areca nut chewers often coat the tooth surface, which act as a protective varnish [26]. Studies have suggested that tannin content of areca nut may have antimicrobial properties and this may contribute to the cariostatic role of areca nut [27]. Habitual chewing may result in incisal and cuspal grinding, which may reduce the risk of pit and fissure caries by eliminating the potential stagnation areas.

Attrition leads to the increased production of sclerosed dentine, thus countering the microbial invasion. Areca nut chewing lead to the production of abundant amount of saliva, presence of slake lime may increase the pH in oral environment; this may act as a buffer against the acid formed in plaque on teeth.

## CONCLUSION

The role of areca nut and its different form have been strongly associated with oral lesion. Contribution of areca nut and its different forms in oral lesion highlights the importance of public health education. These products are inadequately labeled. They are no health warnings labels and no restriction on its sale to children or consumption on public places.

Areca nut usage is culturally bound and is an integral aspect of several Indo-Asian customs and thus part of their identity. Casual use of small quantities of areca nut on a non-regular basis is widely prevalent in Asian communities.

Although this practice is unlikely to have long term ill effects with time, some individuals may develop a dependency syndrome. In certain communities the preparation and sale of areca products makes a significant financial contribution to the local economy. Accurate labelling of the products, especially with respect to admixture with tobacco, should be an important requirement. Health warnings should be enacted, but outright bans or restriction will probably prove to be counterproductive.

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