Betel Chewing and Public Health

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Introduction
The use of betel as a recreational drug is a common practice in Asia and among immigrant communities around the world. Betel quid is a mixture of areca nut, betel leaf, slaked lime (aqueous calcium hydroxide paste), and, in some countries, also includes tobacco. There are several different varieties of betel quid, including kheni (tobacco with lime), mawa (mixture of areca nut, tobacco and slaked lime), pan masala plain (areca nut, catechu, lime, cardamom, and unspecified flavoring agents), and pan masala with tobacco (gutkha). Betel quid is chewed for the main psychoactive ingredient arecoline extracted from the areca nut. Arecoline, a parasympathomimetic tertiary amine, is known to stimulate the central nervous system causing euphoric effects and feelings of heightened alertness.

There is a well-established association between betel quid use and severe oral disorders, including oral submucous fibrosis, oral leukoplakia, oral squamous cell carcinoma, and periodontal disease. It has also been suggested that the deleterious effects of betel quid could extend beyond the oral cavity.

Despite the known harmful effects of betel quid chewing, it remains a socially accepted practice in many societies and its use is popular among women, including pregnant women, and adolescents.

Prevalence
It has been estimated that 600 to 1200 million people (10% to 20% of the world’s population) chew betel quid. It is widely used in South and Southeast Asian countries and the Asia Pacific region. There is also high prevalence of betel quid use in migrant communities in Africa, Europe, and North America. Areca nut is the fourth most commonly consumed psychoactive substance after nicotine, alcohol, and caffeine.

Prevalence rates vary widely in Asian countries. In population-based surveys from India, Nepal, and Pakistan over the past 3 decades, prevalence rates between 20% and 40% of the population...
were reported. Higher prevalence rates, of around 46%, were reported in the Taiwan Aboriginal population. Residents of the Pacific Island of Palau appear to have one of the highest usage rates with approximately 72% of males and 80% of females chewing betel quid. Prevalence of betel quid chewing in Hunan province in China is also comparably widespread, with around 64% to 83% of the adult population adopting the practice.

Betel quid chewing is also common in children. A survey conducted on a small community in Kerala found that 27.4% of boys regularly chewed betel quid containing tobacco, whereas the prevalence of regular used among girls was much lower at 1.6%.

Acute Symptoms

A novice betel nut user may have acute sensations of dizziness, vertigo, nausea, and diaphoresis. Some users complain of blurred or darkened vision on betel nut exposure and miosis or mydriasis can be seen. Heavy betel quid use can cause some individuals to have auditory hallucinations, delusions, and an acute reversible psychosis. In large amounts, it can cause pulmonary edema, bronchoconstriction or bronchospasms, cardiac arrhythmias, and even death.

Chronic Symptoms

Habitual betel quid chewing is strongly associated with several oral mucosal disorders, such as precancerous lesion, oral submucous fibrosis, oral leukoplakia, periodontal disease, and oral squamous cell carcinoma.

Betel quid has known deleterious effects on the periodontium. Two studies examining the periodontal health status of areca nut usage with and without tobacco found that areca nut chewers had increased injury to the periodontal tissues, including increased incidence of gingival recession, bleeding from the gums, mouth ulcers, halitosis, difficulty in opening the mouth, difficulty swallowing solid food, and a burning sensation in the soft tissues than controls. The addition of tobacco to the areca nut leads to a synergistic negative effect on the periodontal tissues. Chronic betel nut use also stains the teeth a dark brown color.

Oral leukoplakia is hyperkeratosis of the oral mucosa epithelium that can potentially progress to a malignancy. The systematic review by Thomas et al collected studies assessing the risk of leukoplakia development among users of betel quid (without tobacco). In the 5 studies identified, when adjusted for smoking, the combined random effect odds ratio (OR) was 7.9 (95% confidence interval [CI] = 4.3-14.6) in betel quid chewers.

A large case–control study in India, including 49 058 subjects evaluated the risk of chewing betel quid without tobacco on the risk of oral precancers. Of the nonsmokers and nondrinkers, chewing betel quid without tobacco resulted in an OR of 22.2 (95% CI = 11.3-43.7) for oral leukoplakia, an OR of 56.2 (95% CI = 21.8-144.8) for oral submucous fibrosis, an OR of 29.0 (95% CI = 5.63-149.5) for erythroplakia, and an OR of 28.3 (95% CI = 6.88-116.7) for multiple oral precancers. The authors observed a dose–response relationship, with the risk of oral mucosal disorders increasing with increasing frequency and duration of its use.

Epidemiological studies demonstrating the relationship between betel quid chewing and oral mucosal disorders have also been confirmed by in vitro studies. A study published in this issue of the journal measured the cytotoxic and genotoxic effect of mixtures containing areca nut and tobacco on human lymphocytes by analyzing the peripheral blood and extent of DNA damage in a mix of chewers and nonchewers. The results revealed that chewers had increased micronuclei frequency and increased DNA damage compared with nonchewers.

Several studies have compared the risk of oral cancer with betel quid with other hazardous lifestyle factors such as alcohol and tobacco. A case–control study in India found people who
chewed betel quid with tobacco (OR = 3.19, 95% CI = 0.48-2.13) and tobacco alone (OR = 2.89) showed a greater risk of oral cancer than controls. The combination of chewing and smoking together with alcohol drinking showed very high relative risk (OR = 11.34).17

The unequivocal evidence on the relationship between betel quid and oral cancer has lead the International Agency for Research on Cancer to classify betel quid as an oral carcinogen in humans with evidence for a dose–response relationship.18

The health risks associated with betel quid chewing are not limited to the oral cavity, with reports of betel quid having deleterious effects on systemic health. The literature review by Javed et al demonstrated that exposure to the areca nut adversely affects systemic health. Javed et al reported the difficulties encountered in summarizing areca nuts effects on systemic health because of the wide varieties of preparations and level and duration of usage in the included studies.4 Of the 28 studies included in the review, 7 studies associated areca nut usage with cardiovascular-related disorders and symptoms such as hypertension, tachycardia, and even ventricular fibrillation. Three studies reported a potential link between areca nut and cerebrovascular conditions, including dizziness, epilepsy, and coma, and 8 studies showed that chewing areca nut increases the risk of obesity, hyperglycemia, and type 2 diabetes mellitus. Five studies highlighted an association between the chewing of areca nut and liver disorders. Areca nut chewing was also associated with esophageal inflammation and fibrosis in 2 studies, renal disease in 2 studies, respiratory discomfort in 3 studies, and 2 studies showed an association between areca nut use on and low birth weight.4

Wen et al7 conducted a large cohort study in Taiwan that aimed to assess the risk of cancer with betel quid chewing (without tobacco added) beyond oral cancer. The risk for all cancer was doubled among chewers (hazard ratio [HR] = 2.00, 95% CI = 1.73-2.31). Wen et al reported an increased risk of at least 6 cancer sites among betel quid chewers: oral cavity (HR = 12.52, 95% CI = 5.45-28.77), esophagus (HR = 5.64, 95% CI = 2.25-14.12), liver (HR = 2.27, 95% CI = 1.12,4.60), pancreas (HR = 2.67, 95% CI = 1.23-5.78), larynx (HR = 6.24, 95% CI = 1.04-37.44), and lung (HR = 2.43, 95% CI = 1.73-3.41). The authors observed a dose-dependent relationship, with most risks increasing with increases in betel quid usage. Smoking interacted synergistically with betel quid chewing and accounted for half of all cancer deaths in the group that used both.7

Betel quid has the potential to induce dependence among heavy chewers, with some individuals suffering from withdrawal symptoms similar to that of nicotine withdrawals.2,12

**Conclusion**

Betel quid chewing has detrimental effects on health that are not restricted to the oral cavity. Additionally, these products have the potential to become addictive. There is certainly enough evidence to continue public health campaigns against betel quid use. Now the journal has published a study suggesting that betel use may also damage genetic material and we look forward to further confirmation of this study. The journal will welcome further discussion of this public health issue and strategies that could be used to reduce the public health impact.

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