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Research Article

Betel Quid Chewing as a Contributing Factor to Periodontal Tissue Destruction and Oral Health Decline

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Abstract

Background: Chewing betel quid is a custom that is widespread throughout Asia, has been linked to a number of oral health problems such as periodontitis. It entails consuming a mixture of areca nut, lime, betel leaf, and occasionally tobacco.

Objective: This study aimed to investigate the effect of the duration and frequency of betel quid chewing behavior on periodontitis severity in individuals coming to Periodontology OPD.

Materials and Methods: The type of study was an analytical observational study with a cross-sectional design. A logbook questionnaire was used to obtain socio demographic data, plaque index, bleeding on probing, clinical attachment loss and pocket depth.

Results: The largest number of respondents was male. Duration of chewing had a significant relationship with the frequency of chewing and periodontal status. Periodontitis was higher compared to all categories.

Conclusion: The betel nut chewing greatly influences people's oral health. Prolonged and excessive use of betel nut induced significant adverse effects on human health. The longer and more often chew betel or areca nut, the higher the incidence of periodontitis, which significantly affects the quality of life as there is a possibility of the development of carcinogenesis, particularly in the oral cavity.

Keywords: *Betel Nut; Betel Nut Chewing; Periodontitis; Oral Cancer; Clinical Attachment Loss; Gingival Bleeding; Pocket Depth*

Introduction

Betel nut chewing is a common habit in South and Southeast Asia, where it plays an important cultural and social role, where 17.7% of the population chews betel [1]. Chewing betel is seen as a gesture of respect and hospitality, helping to spark conversations and build social connections across different regions [2].

Betel nut has also been traditionally used for its medicinal properties throughout Southeast Asia and the Asia-Pacific. Anthropological research suggests that it can produce euphoric and mood-lifting effects [3]. As reported by study, it also strengthen teeth and gums,

improve digestion, reduce nausea, treat diarrhea, eliminate parasites, enhance thinking ability, and either increase or reduce appetite [4]. Additionally, it is thought to act as a pain reliever and sedative. Some of these effects have been backed by scientific studies, particularly its psychoactive impact. Moreover, betel nut use has also been linked to addiction, and its long-term use is associated with serious health risks such as oral cancer, gum disease, and precancerous conditions [5].

Despite its deep cultural roots, the widespread use of betel nut poses a significant public health challenge. Studies have consistently linked long-term chewing to a heightened risk of oral cancers, particularly oral sub mucous fibrosis a potentially malignant condition that limits mouth opening and can severely impact quality of life [6]. In many betel-chewing regions, access to dental care and cancer screening is limited, making early detection and treatment difficult [7]. The combination of tobacco and slaked lime in betel quid further increases carcinogenic risks, compounding the health burden in affected populations [8].

To address these concerns, several countries have begun public health campaigns aimed at reducing betel nut use. Education programs targeting youth and pregnant women are increasingly common, highlighting the health risks and promoting alternatives [9]. In addition, researchers and policymakers are working to balance cultural respect with health promotion by encouraging safer practices and offering cessation support. However, tackling betel nut dependence remains complex, as it is deeply woven into social customs and identity. Long-term solutions will likely require a mix of culturally sensitive education, community engagement, and accessible health services [10].

Aim of the Study

This study aimed to investigate the effect of the duration and frequency of betel quid chewing behavior on periodontitis severity in individuals coming to Periodontology OPD.

Material and Methods

This observational analytic study employed a cross-sectional design with a random sampling technique to observe and analyze data related to the periodontal condition of individuals with a habit of betel nut chewing. The study was conducted over a period of nine months at the Periodontology Outpatient Department, Karachi. A total of 100 participants were included in the study, consisting of 60 males and 40 females, all within the age range of 35 - 50 years. Among them, 70 participants were married and 30 were unmarried. All participants had a history of betel nut chewing for varying durations. Data were obtained from logbooks maintained by third-year BDS students during their periodontology rotation, who recorded clinical findings during patient examinations. The parameters assessed included the Oral Hygiene Index (OHI), periodontal pocket depth (PPD), and clinical attachment loss (CAL). Periodontal examinations were performed using standard diagnostic instruments, including a mouth mirror, WHO periodontal probe, gloves, masks, mouthwash, and clean water. The WHO periodontal probe used in the study had a 0.5 mm ball tip, a black band marker at 3.5 - 5.5 mm, and a ring marker at 8.5 - 11.5 mm from the tip. The probing pressure did not exceed 20 grams, and the probe was gently guided along the anatomical contour of each tooth root. Two main indicators were used to assess periodontal status: bleeding on probing (BOP) and periodontal pocket depth (PPD). Pocket depth was categorized as 4 - 5 mm and ≥ 6 mm. The duration of betel nut chewing was defined as the time elapsed from the initiation of the habit until the date of examination and was classified into three groups: 10 - 20 years, 21 - 30 years, and more than 31 years. After data collection, all recorded scores were compiled and analyzed using SPSS software. The Spearman correlation test was applied to determine the relationship between the duration of betel nut chewing and various periodontal parameters, including gingival bleeding, pocket depth, and clinical attachment loss.

Study design:

- Observational analytic study.
- Cross-sectional design.

Sampling technique: Random sampling of participants.

Study setting and duration:

- Periodontology outpatient department, Karachi.
- Duration: 9 months.

Participant selection (n = 100)

- 60 males, 40 females.
- Age range: 35 - 50 years.
- 70 married, 30 unmarried.
- All with history of betel nut chewing.

Data source: Logbooks maintained by 3rd-year BDS students during their periodontology rotation (Clinical findings during patient examinations).

Parameters assessed:

- Oral hygiene index (OHI).
- Periodontal pocket depth (PPD).
- Clinical attachment loss (CAL).

Periodontal examination procedure:

- Instruments: Mouth mirror, WHO probe, gloves, masks, mouthwash, water.
- WHO probe: 0.5 mm ball tip; markings at 3.5 - 5.5 mm and 8.5 - 11.5 mm.
- Probing pressure ≤ 20 grams.
- Probe guided along tooth root contour.

Indicators of periodontal status:

- Bleeding on probing (BOP).
- Pocket depth:
- 4-5 mm.
- ≥6 mm.

Classification of betel nut chewing duration:

- 10 - 20 years.
- 21 - 30 years.
- > 31 years.

Data analysis

- Software: SPSS.
- Test Used: Spearman correlation.

Variables: Duration of betel nut chewing vs

- Gingival bleeding
- Pocket depth
- Clinical attachment loss.

Patient Diagnostic and Examination Chart

Registration No: _____ **Date**: _____

Name: _____ **Age**: _____ **Occupation**: _____

Address:_____

Presenting Complaint:_____

History of Presenting Complaint: _____

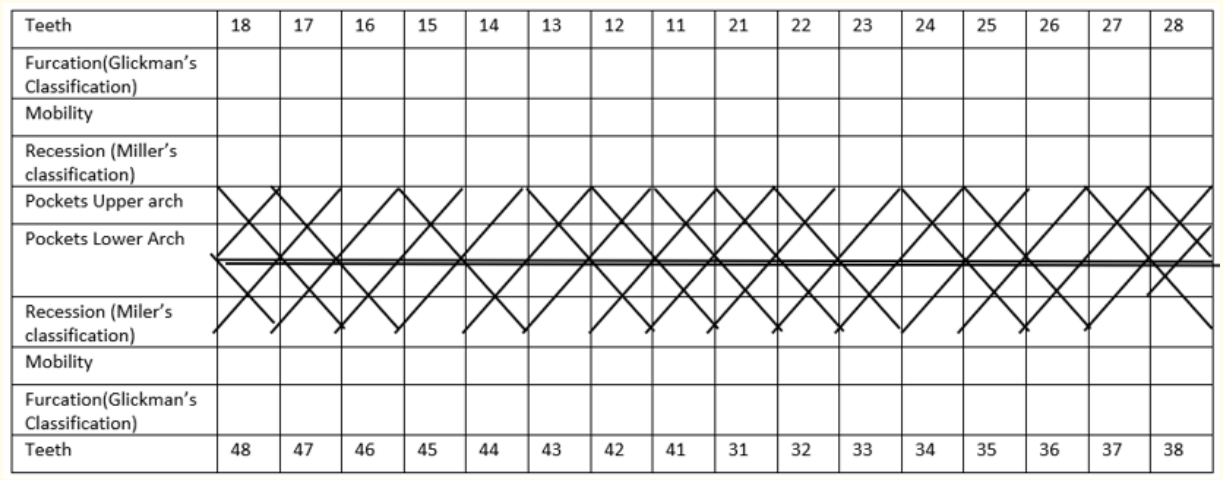
Medical History:

Examination:

GINGIVAL STATUS

	Upper right posterior	Upper anterior	Upper left posterior
Color			
Contour			
Size			
Consistency			
Stippling			
Position			
Bleeding on probing			
Exudation			
	Lower right posterior	Lower anterior	Lower left posterior
Color			
Contour			
Size			
Consistency			
Stippling			
Position			
Bleeding on probing			
Exudation			

PERIODONTAL CHARTING



Figure

Diagnosis: _____ Treatment Done_____

Results

The results of research conducted on 100 people in Periodontology OPD, showed betel quid chewing is more common among men than women. Long and frequent duration of chewing allowed the occurrence of periodontitis, and conversely, shorter and less frequent chewing resulted in many normal conditions, men have a higher average in the predisposing and reinforcing domains, while women have a higher average in enabling domain. Those who have used betel nut for 10 to 20 years have higher rates in developing periodontal disease, whereas those who have used betel nut for 31 years or more have higher averages. According to the frequency of betel quid, those who consumed betel nuts more than five times per day had higher rates of reinforcing (7.96) and lifestyle (8.72) domains, while those who consumed betel nuts three to five times per day had the highest rate (10.10). Table 1 presents the descriptive characteristics of the 100 respondents from periodontology OPD, including their gender, age, marital status, physical and psychological domain.

Variable	Category	n (%)	Physical Health Mean ± SD	Psychological Domain Mean ± SD
Gender	Male	60 (46.3%)	17.76 ± 2.72	10.91 ± 1.34
	Female	40 (26.7%)	17.93 ± 2.24	10.94 ± 1.20
Age (years)	30-40	55 46.7%	18.25 ± 2.30	—
	41-50	45 30.0%	—	—
	≥51	23.3%	—	—
Marital Status	Married	92.7%	17.80 ± 2.51	—
	Unmarried	7.3%	18.36 ± 2.29	—

Table 1: *Descriptive data of 100 people in attending Periodontology OPD.*

Among the respondents, 60 (46.3%) were male and 40 (26.7%) were female. Males showed a mean physical health score of 17.76 ± 2.72, while females scored 17.93 ± 2.24. The psychological domain scores were similar between males (10.91 ± 1.34) and females (10.94 ± 1.20). With respect to age, 46.7% of respondents were aged 30-50 years, 30.0% were aged 35-45 years, and 23.3% were aged 51 years or older. Participants aged 30-40 years showed the highest mean score in the physical health domain (18.25 ± 2.30), while those aged 41-50 years scored highest in the environmental domain (16.41 ± 2.18).

A majority of participants were married (92.7%), while 7.3% were unmarried. Married individuals showed a mean physical health score of 17.80 ± 2.51, while unmarried individuals scored slightly higher (18.36 ± 2.29).

Table 2 shows comparison between betel nut chewers and non-betel nut chewers revealed a clear difference in periodontal health status. Betel nut chewers exhibited a significantly greater mean clinical attachment loss (3.8 ± 1.2 mm) and periodontal pocket depth (< 0.001).

Parameter	Betel Nut Chewers (n = 100)	Non-Betel Nut Chewers (n = 100)	p-value	Interpretation
Mean Clinical Attachment Loss (mm)	3.8 ± 1.2	1.9 ± 0.8	<0.001	Significant increase in CAL among chewers
Mean Pocket Depth (mm)	4.5 ± 1.1	2.7 ± 0.9	<0.001	Significant increase in PPD among chewers
Patients with PPD ≥ 4 mm (%)	72%	28%	<0.001	Higher prevalence of deep pockets in chewers
Patients with CAL ≥ 3 mm (%)	68%	24%	<0.001	Higher attachment loss in chewers
Bleeding on Probing (BOP) (%)	80%	40%	<0.001	Greater gingival inflammation in chewers

Table 2: *Comparison of clinical attachment loss and pocket depth between betel nut chewers and non betel nut chewers.*

A higher proportion of betel nut chewers (72%) presented with periodontal pockets ≥4 mm, and 68% showed clinical attachment loss ≥ 3 mm, while these conditions were observed in only 28% and 24% of non-chewers, respectively. Furthermore, bleeding on probing (BOP) was markedly more frequent among chewers (80%) than non-chewers (40%), indicating increased gingival inflammation.

Overall, these results demonstrate that betel nut chewing is strongly associated with increased periodontal pocket depth, attachment loss, and gingival bleeding, suggesting that the habit contributes significantly to the progression of periodontal disease.

Table 3 demonstrates a statistically significant association between both the duration and frequency of chewing and periodontal status. Individuals with a longer duration of chewing habit showed a higher prevalence of periodontitis compared to those with a shorter duration. Specifically, participants who had been chewing for more than 10 years exhibited a greater proportion of periodontitis cases than those who had been chewing for 3 - 5 years, and this difference was statistically significant ($p < 0.05$).

Variable	Category	Normal Periodontal Status n (%)	Periodontitis n (%)	Total (N)	p-value
Duration of Chewing (years)	3-5 years	8 (34.8)	15 (65.2)	23	0.000*
	6-10 years	—	—	—	—
	>10 years	5 (20.0)	20 (80.0)	25	0.005*
Frequency of Chewing	<3 times/day	0 (0.0)	15 (100)	15	0.000*
	3-5 times/day	61 (75.3)	20 (24.7)	81	0.005*
	>5 times/day	89 (57.8)	65 (42.2)	154	0.005*
Correlation Coefficient (r)	Duration of chewing	—	0.330	—	—
	Frequency of chewing	—	0.222	—	—

Table 3: *Association between duration and frequency of chewing with periodontal status.*

Similarly, the frequency of chewing was significantly associated with periodontal status. Participants who chewed more frequently per day had a higher prevalence of periodontitis. All individuals who chewed fewer than three times per day were affected by periodontitis, while an increasing proportion of periodontitis was also observed among those chewing more than five times per day. These differences were statistically significant ($p < 0.05$).

Correlation analysis further supported these findings. A moderate positive correlation was observed between duration of chewing and periodontitis ($r = 0.330$), indicating that the likelihood of periodontitis increases as the duration of chewing increases. Additionally, a mild positive correlation was found between frequency of chewing and periodontitis ($r = 0.222$), suggesting that higher chewing frequency is associated with an increased risk of periodontal disease.

Overall, the findings indicate that both prolonged and frequent chewing habits are significantly associated with poorer periodontal health, and the observed relationships are unlikely to be due to chance.

Figure 1 shows the line graph below illustrates the impact of long-term betel nut chewing on oral health. Over a 10-year period, individuals who chew betel nut show a marked decline in oral health scores compared to non-chewers, whose oral health remains relatively stable.

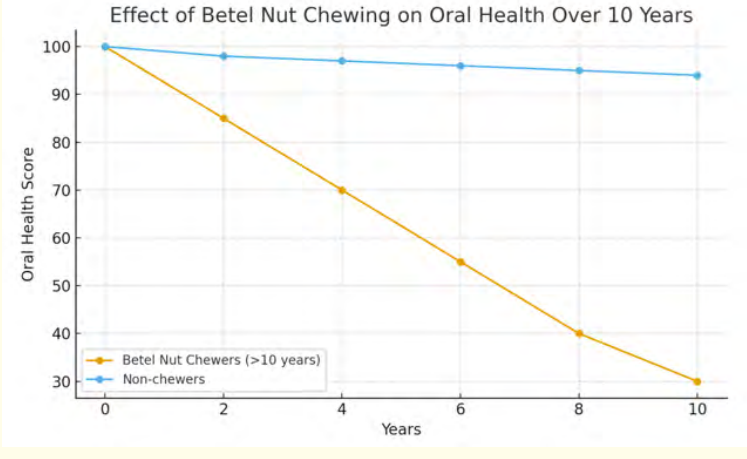


Figure 1: *Comparison of oral health decline between betel nut chewers (>10 years) and non-chewers.*

Discussion

The review's findings indicate that betel quid chewing significantly increases the risk of periodontitis. Betel quid chewing is increasingly recognized as a significant contributing factor to periodontal destruction due to its direct and indirect effects on the oral environment according to Reza Agustina., *et al*. [11]. The habitual chewing of betel quid exposes periodontal tissues to various harmful chemical agents, particularly arecoline, the primary alkaloid found in the areca nut. According to Nurdin N., *et al*. arecoline has been shown to induce cytotoxicity in gingival fibroblasts and periodontal ligament cells, disrupting their normal growth, attachment, and repair mechanisms [12]. This cellular damage initiates chronic inflammation, which is a key driver of periodontal tissue breakdown. Moreover, the mechanical irritation from chewing further exacerbates tissue injury, creating an environment prone to progressive periodontal destruction by Rani P., *et al*. [13].

Brucato N., *et al*. another critical aspect of betel quid chewing is its impact on the oral microbiome. Studies indicate that betel quid alters the balance of microbial communities in the mouth, favoring the proliferation of pathogenic bacteria linked to periodontal disease [14]. This microbial imbalance or dysbiosis not only promotes inflammation but also impairs the host's immune response, allowing periodontal pathogens to thrive and inflict greater tissue damage. Bandaranayake CA., *et al*. consequently concluded, users who chew betel quid frequently and over extended periods tend to experience more severe forms of periodontitis, with increased gingival recession, pocket formation, and alveolar bone loss, all of which undermine tooth stability and oral function [15].

The relationship between betel quid chewing and periodontal disease is further complicated by systemic conditions such as diabetes mellitus, which has a bidirectional interaction with periodontitis [16]. Betel quid chewers with diabetes may face compounded risks, as diabetes impairs wound healing and immune defense, while periodontitis worsens glycemic control [17]. This interplay not only accelerates periodontal destruction but also poses broader health risks, underscoring the need for integrated healthcare approaches that address both oral and systemic conditions in affected individuals [18].

Lastly, the sociocultural context of betel quid chewing plays an important role in its prevalence and impact on oral health. The habit is deeply ingrained in many communities, often associated with specific age groups, genders, and socioeconomic statuses [19]. For example, middle-aged adults, particularly men and individuals with limited education or certain occupations like farming, are more likely to engage in this practice. This demographic pattern highlights the necessity for culturally sensitive public health interventions aimed at reducing betel quid consumption [20]. Educating communities about the risks of periodontal destruction and encouraging alternative behaviors can help mitigate the harmful oral health consequences associated with betel quid chewing [21].

Chewing betel nut has been closely associated with a decline in oral health, especially in areas where the practice is a part of the culture. This habit subjects the mouth to arecoline and other alkaloids that result in irritation, teeth staining, and gradual harm to the oral mucosa [22]. Niaz K., *et al*. said long-term chewing typically results in gum recession, tooth erosion, and a heightened risk of periodontal disease due to the nut's abrasive qualities and the lime commonly included in the mixture [23]. More concerning, extended use represents a significant risk factor for oral sub mucous fibrosis, a precancerous condition marked by restricted mouth opening and stiffness of the oral tissues, which can advance to oral cancer [24]. The cultural acceptance of betel nut chewing and its addictive nature further hinder prevention efforts, highlighting the necessity for public health education and culturally aware cessation programs.

In this study, participants who had chewed betel for longer periods and with greater frequency exhibited the highest rates of periodontal disease. The duration and frequency of betel or areca nut chewing were directly associated with increased periodontitis incidence, significantly affecting quality of life.

Conclusion

Betel quid chewing is a significant risk factor contributing to periodontal destruction through its toxic effects on periodontal cells and promotion of chronic inflammation. The duration and frequency of betel quid use are closely linked to increased severity of periodontitis, which adversely impacts oral health. Additionally, the habit is influenced by sociocultural and demographic factors, highlighting the need for targeted public health interventions. Given the associated risks of oral cancer and systemic complications comprehensive strategies aimed at reducing betel quid consumption are essential to improve periodontal and overall health outcomes in affected populations.

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