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The Impact of Betel Nut Chewing on Oral Health in Rural Bangladesh

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Abstract

Background: Betel nut chewing is a deeply ingrained cultural practice in various regions, including rural Bangladesh. Despite its cultural significance, this habit poses significant health risks, particularly concerning oral health. This study aims to assess the impact of betel nut chewing on oral health among individuals in rural Bangladesh. ***Methods:*** A descriptive cross-sectional study was conducted at the Jamalpur 250 Bedded General Hospital in Bangladesh from January to July 2023. A total of 150 adult participants were recruited. Data collection involved structured questionnaires covering demographic information, betel nut chewing habits, and self-reported oral health issues, complemented by clinical oral examinations performed by qualified dentists. ***Results:*** Out of 150 participants, 100 (66.7%) reported habitual betel nut chewing. Among these chewers, 70% engaged in daily chewing, with 40% having chewed for 5-10 years. Common oral health issues identified among chewers included dental discoloration (60%), periodontal disease (45%), and oral submucous fibrosis (30%). A significant association was observed between the duration of betel nut chewing and the prevalence of oral health conditions; participants chewing for over 10 years exhibited higher rates of oral submucous fibrosis (66.7%) and leukoplakia (33.3%). ***Conclusion:*** The study underscores a strong association between betel nut chewing and adverse oral health outcomes in rural Bangladesh. The findings highlight the need for targeted public health interventions to raise awareness about the risks of betel nut consumption and to promote oral health in these communities.

Keywords: Betel nut chewing, oral health, rural Bangladesh, oral submucous fibrosis, periodontal disease, leukoplakia, public health intervention.

INTRODUCTION

Betel nut chewing, a longstanding sociocultural practice, is observed in various regions globally. Also known as "Areca" nut, it has diverse local names, including "gua" (Sylhet, Bangladesh), "supari" (Hindi, India), "puwak" (Sri Lanka), "mak" (Thailand), "pugua" (Guam), "pinang" (Malaysia), and "Kunywet" (Myanmar). This practice often involves chewing a combination of crushed areca nuts with ingredients like tobacco, slaked lime, spices, and other additives [1]. Globally, an estimated 10% to 20% of the population, roughly 600 million people, chew betel quid [2]. Areca nut consumption is particularly prevalent in South Asia and among populations of Indian subcontinent origin [3]. Chewing betel nut is widely accepted and integrated into daily life in many South Asian countries. Similarly, it is a favored activity among Indigenous populations in China [4,5].

Research indicates several factors contribute to the initiation of betel nut chewing, including social acceptance and influence, cultural traditions, peer pressure, limited awareness of health risks, and easy access to betel nut products [6].

Despite its deep-rooted cultural significance in various regions, including Bangladesh, betel nut chewing poses significant health risks and is recognized as carcinogenic to humans. Regular consumption has been associated with numerous adverse oral health effects, such as dental discolouration, erosion, periodontal disease, and the development of precancerous lesions like erythroplakia and leukoplakia. Additionally, conditions like oral submucous fibrosis, which leads to reduced mouth opening, and temporomandibular joint disorders have been linked to this practice [7-11]. Betel quid, a mixture commonly chewed in various cultures, is recognized as carcinogenic to humans. Each component contributes to the development of oral cancer through specific carcinogenic substances. Smokeless tobacco incorporated into betel quid contains nitrosonornicotine and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone,

both potent carcinogens. The areca nut, a primary ingredient, contains arecoline, an alkaloid linked to oral submucous fibrosis—a precancerous condition—and 3-(methylnitrosamino)propionitrile, another carcinogenic compound. Additionally, slaked lime, often added to betel quid, provides reactive oxygen species that can damage cellular structures and contribute to carcinogenesis [12]. Initially, it was believed that the carcinogenic effects of betel nut were primarily due to its combination with tobacco products. However, subsequent research has demonstrated that betel nut alone is carcinogenic to humans. Oral cavity cancer ranks as the 16th most common malignancy worldwide, with 389,846 new cases reported in 2022 [13]. In Bangladesh, oral cancer represents a significant public health concern. A study by Debnath *et al.*, titled "Impact of Tobacco Smoking, Betel Quid Chewing, and Alcohol Consumption Habits in Patients with Oral Cavity Cancer in Bangladesh," found that approximately 68.5% of cancer patients engaged in betel leaf chewing. The study concluded that tobacco smoking and betel quid chewing are strong risk factors in the development of oral cancer [14 Beyond its well-documented oral health implications, betel nut chewing has been linked to several systemic health issues. Research indicates associations between betel nut consumption and metabolic syndrome, hypertension, diabetes mellitus, and obesity. A meta-analysis of 17 Asian studies found that betel quid chewing is associated with an increased risk of metabolic disease, cardiovascular disease, and all-cause mortality [15]. Additionally, a study published in the *Journal of the American College of Cardiology* reported that longer duration and earlier age of onset of paternal betel chewing are associated with an increased risk of metabolic syndrome in offspring [16]. These findings underscore the broader health risks associated with betel nut chewing, extending beyond oral health to encompass significant systemic conditions.

OBJECTIVE

The objective of this study is to evaluate the impact of betel nut chewing on oral health among individuals in rural Bangladesh, focusing on the prevalence of oral diseases and associated health risks.

METHODS

Study Design

A descriptive cross-sectional study was conducted at the Jamalpur 250 Bedded General Hospital in Bangladesh from January to July 2023. This design was chosen to assess the impact of betel nut chewing on oral health among patients attending the hospital.

Study Setting

The study was carried out at Jamalpur 250 Bedded General Hospital, which serves a diverse population from both urban and rural areas. The hospital provides a range of healthcare services, making it an appropriate setting for this research.

Study Population

The target population for this study included adult patients (aged 18 years and above) who visited the outpatient department of the hospital during the study period. Participants were selected based on their willingness to participate and their ability to provide informed consent.

Sample Size

A total of 150 participants were recruited for the study using a convenience sampling method. This sample size was determined based on the expected prevalence of oral health issues related to betel nut chewing and the resources available for data collection.

Data Collection

Data was collected using a structured questionnaire that incorporated both closed and open-ended questions, designed to comprehensively gather information relevant to the study's objectives. The questionnaire included sections on demographic information, such as age, gender, occupation, education level, and socioeconomic status, to provide a contextual background of the participants. Additionally, it explored betel nut chewing habits by assessing the frequency, duration, and quantity of consumption, as well as the specific types of products used, including areca nut, betel leaf, and slaked lime. To evaluate oral health status, participants were asked to self-report any oral health issues they experienced, including symptoms like pain, swelling, and difficulty in chewing, along with any diagnosed conditions such as oral submucous fibrosis and periodontal disease. Furthermore, the questionnaire addressed health-seeking behavior by gauging participants' awareness of the health risks associated with betel nut chewing and their utilization of dental services. Prior to the main data collection, the questionnaire was pre-tested on a small sample of participants to ensure clarity and reliability. Trained research assistants then administered the questionnaire through face-to-face interviews, which enhanced data accuracy and allowed for immediate clarification of any questions or concerns raised by the participants. This approach ensured a comprehensive and reliable collection of data pertinent to the study's focus on the impact of betel nut chewing on oral health.

Clinical Examination

In addition to the questionnaire, a clinical examination was conducted by a qualified dentist to assess the oral health status of participants. The examination included:

- Visual inspection of the oral cavity for signs of oral submucous fibrosis, periodontal disease, and other oral lesions.
- Assessment of oral hygiene status using the Simplified Oral Hygiene Index (OHI-S).
- Recording of any dental caries or other dental conditions.

Data Analysis

Data was analyzed using statistical software SPSS Version 26. Descriptive statistics, including frequencies and percentages, were used to summarize demographic characteristics and betel nut chewing habits. The association between betel nut chewing and oral health outcomes was assessed using chi-square tests, with a significance level set at $p < 0.05$.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Review Board of Jamalpur 250 Bedded General Hospital. Informed consent was obtained from all participants prior to data collection, ensuring that they understood the purpose of the study and their right to withdraw at any time without any consequences.

Limitations

The cross-sectional nature of this study prevents the establishment of causal relationships between betel nut chewing and oral health. Furthermore, the use of self-reported data may introduce bias due to potential under- or over-reporting of chewing habits and oral health problems. Despite these limitations, this study offers valuable insights into the impact of betel nut chewing on oral health within rural Bangladesh, thus contributing to the existing literature and informing public health initiatives.

RESULTS

Table 1 presents the demographic characteristics of the 150 participants involved in the study. The age distribution indicates that the largest group of participants (30.0%) falls within the 18-29 age range, followed by 26.7% in the 30-39 bracket, 23.3% aged 40-49, and 20.0% aged 50 and above. The gender composition shows a higher representation of males (56.7%) compared to females (43.3%). Regarding occupation, a significant portion of the participants are farmers (33.3%), with labourers comprising 26.7%, housewives 23.3%, and the remaining 16.7% engaged in various other occupations. This demographic profile provides a comprehensive overview of the study sample, highlighting a diverse age range and occupational background, with a predominance of male participants.

Table 1: Demographic Characteristics of Participants (N=150)

Characteristic	Frequency (n)	Percentage (%)
Age Group		
18-29	45	30.0
30-39	40	26.7
40-49	35	23.3
50 and above	30	20.0
Gender		
Male	85	56.7
Female	65	43.3
Occupation		
Farmer	50	33.3
Laborer	40	26.7
Housewife	35	23.3
Others	25	16.7

Table 2 illustrates the betel nut chewing habits among the study participants. Out of the total 150 participants, 100 individuals (66.7%) reported engaging in betel nut chewing. Among these chewers, a significant majority (70.0%) consumed betel nut daily, while 20.0% did so weekly, and 10.0% chewed occasionally. Regarding the duration of this habit, 30.0% had been chewing betel nut for less than 5 years, 40.0% for 5 to 10 years, and the remaining 30.0% for more than 10 years. These findings highlight the prevalence and frequency of betel nut consumption within the study population, indicating a substantial proportion of participants with long-term and regular usage patterns.

Table 2: Betel Nut Chewing Habits among Participants

Habitual Aspect	Frequency (n)	Percentage (%)
Betel Nut Chewers	100	66.7
Frequency of Chewing		
Daily	70	70.0
Weekly	20	20.0
Occasionally	10	10.0
Duration of Chewing		
<5 years	30	30.0
5-10 years	40	40.0
>10 years	30	30.0

Table 3 presents the prevalence of various oral health conditions among the 100 betel nut chewers in the study. Dental discoloration was the most commonly reported issue, affecting 60% of participants. Periodontal disease was observed in 45% of chewers, while 30% exhibited signs of oral submucous fibrosis. Leukoplakia and erythroplakia were less prevalent, affecting 20% and 10% of participants, respectively. These findings underscore the significant oral health challenges associated with habitual betel nut chewing in the study population.

The high prevalence of dental discoloration and periodontal disease aligns with findings from other studies in Bangladesh, where betel nut chewing has been linked to various oral health issues.

Table 3: Oral Health Issues among Betel Nut Chewers

Oral Health Condition	Frequency (n)	Percentage (%)
Dental Discoloration	60	60.0
Periodontal Disease	45	45.0
Oral Submucous Fibrosis	30	30.0
Leukoplakia	20	20.0
Erythroplakia	10	10.0

Table 4 illustrates the relationship between the duration of betel nut chewing and the prevalence of specific oral health conditions among participants. In individuals who have chewed betel nuts for less than 5 years, 66.7% reported no significant oral health issues, while 33.3% experienced minor problems. Among those with 5 to 10 years of chewing history, 62.5% exhibited dental discoloration, and 37.5% had periodontal disease. In the group with over 10 years of betel nut chewing, 66.7% developed oral submucous fibrosis, and 33.3% had leukoplakia.

Table 4: Association between Duration of Betel Nut Chewing and Oral Health Conditions

Duration of Chewing	Oral Health Condition	Frequency (n)	Percentage (%)
<5 years	No significant issues	20	66.7
	Minor issues	10	33.3
5-10 years	Dental discoloration	25	62.5
	Periodontal disease	15	37.5
>10 years	Oral submucous fibrosis	20	66.7
	Leukoplakia	10	33.3

This table illustrates participants' health-seeking behaviors regarding their awareness of betel nut chewing's health risks and their dental visit frequency. The data reveals that most participants (66.7%) are unaware of these health risks. Furthermore, a considerable portion (73.3%) did not visit a dentist in the past year, suggesting a potential underutilization of oral health services. These results highlight the importance of targeted health education and awareness initiatives to educate the community about the dangers of betel nut chewing and promote regular dental visits.

Table 5: Health-Seeking Behavior among Participants

Behavior Aspect	Frequency (n)	Percentage (%)
Awareness of Health Risks		
Aware	50	33.3
Not Aware	100	66.7
Dental Visits in Past Year		
Yes	40	26.7
No	110	73.3

DISCUSSION

The findings of this study underscore the significant prevalence of betel nut chewing among the rural population in Jamalpur, Bangladesh, with 66.7% of participants identified as habitual chewers. This aligns with previous research conducted in Sylhet, which reported a prevalence rate of 42.4% among local residents, highlighting the widespread nature of this practice in various regions of Bangladesh [17].

A notable observation from our study is the association between the duration of betel nut chewing and the manifestation of oral health issues. Participants who had been chewing betel nut for over a decade exhibited higher incidences of oral submucous fibrosis (66.7%) and leukoplakia (33.3%). These findings are consistent with a study in the Kishore Ganj District, which documented a significant correlation between

prolonged betel nut consumption and the development of oral lesions [18].

Despite the high prevalence of betel nut chewing and its associated health risks, our study revealed a concerning lack of awareness among participants. A majority (66.7%) were unaware of the potential health hazards linked to this habit. This lack of awareness is corroborated by research from Sylhet, where only 33.3% of respondents recognized the harmful consequences of betel nut chewing [17].

Furthermore, health-seeking behavior was suboptimal, as evidenced by the fact that 73.3% of participants had not visited a dental professional in the past year. This reluctance or inability to seek professional dental care exacerbates the risk of undiagnosed and untreated oral health conditions progressing to more severe stages.

The study's findings are consistent with broader research indicating that betel nut chewing adversely affects oral health, leading to conditions such as periodontal disease, oral submucous fibrosis, and oral cancer [19].

The low rate of dental consultations observed in our study, with only 26.7% of participants having visited a dentist in the past year, further exacerbates the issue. This trend suggests potential barriers to accessing oral healthcare services, which may include financial constraints, limited availability of services in rural areas, or a general undervaluation of oral health.

The cultural entrenchment of betel nut chewing in Bangladeshi society presents a formidable challenge to public health initiatives. The practice is often perceived as a benign cultural tradition, overshadowing its detrimental health implications. A report by The Daily Star highlighted the rising cases of oral cancers linked to betel nut consumption, emphasizing the need for increased public awareness and intervention [20].

CONCLUSION

This study highlights the pervasive practice of betel nut chewing in rural Bangladesh and its significant association with adverse oral health outcomes. The correlation between the duration of betel nut uses and the prevalence of conditions such as oral submucous fibrosis and leukoplakia is particularly concerning. The low levels of awareness regarding the health risks and the inadequate utilization of dental services further compound the issue. These findings underscore the urgent need for comprehensive public health strategies aimed at raising awareness, reducing betel nut consumption, and promoting regular dental check-ups to mitigate the oral health burden in this population.

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