GYANBODH
An International Multidisciplinary Peer Reviewed Journal
ISSN:3048-9792
Volume: 3
Issue: 2
March - April: 2026

Cognitive Failures Associated with Betel Quid Dependence among Young Adults in Assam

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Abstract

Betel quid consumption is widely prevalent in Assam, particularly among young adults, yet its cognitive implications remain underexplored. The present study examined betel quid dependence and its relationship with cognitive failures among college-going and working young adults. A descriptive and correlational design was used with 93 participants aged 18–25 years selected through purposive sampling. The Betel Quid Dependence Scale and Cognitive Failures Questionnaire were used for assessment. Results indicated moderate dependence (M = 4.41), with no significant difference between college-going (M = 4.74) and working individuals (M = 3.98; $p > .05$). Cognitive failures were significantly higher among college-going participants (M = 41.63) compared to working young adults (M = 34.50; $t = 2.34$, $p < .05$). Although no significant overall correlation was found between dependence and cognitive failures ($r = –0.015$, $p > .05$), a weak positive trend was observed among college-going participants ($r = 0.133$), suggesting a possible association under academic demands. These findings indicate that college-going young adults may experience greater everyday cognitive difficulties, highlighting a potential area of concern within academic settings. The results underscore the need for increased awareness and preventive strategies addressing substance use and cognitive well-being among students.

Keywords: *Betel Quid Dependence, Cognitive Failures, Young Adults, Substance Abuse*

INTRODUCTION

Betel quid consumption is a widely prevalent practice across South and Southeast Asia, particularly in Assam, where it is deeply embedded in socio-cultural traditions and everyday life. Despite its cultural acceptance, betel quid contains psychoactive compounds, primarily arecoline, which act on the central nervous system and influence cognitive functioning (Gupta & Warnakulasuriya, 2002; Chu, 2001). While short-term use may produce stimulating effects such as increased alertness, prolonged consumption has been

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An International Multidisciplinary Peer Reviewed Journal
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associated with alterations in brain regions involved in attention, memory, and executive functioning (Huang et al., 2020; Tung et al., 2015). Betel quid use is especially common among young adults due to factors such as easy availability, peer influence, and perceived cognitive benefits. Research conducted in Assam has reported high prevalence and early initiation of use, indicating a strong behavioral pattern that may develop into dependence over time (Kumar et al., 2023; Mahanta et al., 2021). Dependence is characterized by craving, tolerance, and withdrawal symptoms, which can interfere with daily functioning and concentration (Winstock et al., 2000). The Betel Quid Dependence Scale has been widely used to assess such dependence patterns reliably (Lee et al., 2012). Cognitive failures refer to everyday lapses in attention, memory, and action, such as forgetfulness, distraction, and unintended mistakes (Broadbent et al., 1982). These failures are common in daily life and are influenced by factors such as attentional control, cognitive load, and working memory capacity (Kane & Engle, 2002; Eysenck et al., 2007). They are typically measured using the Cognitive Failures Questionnaire, which assesses the frequency of such lapses in routine activities (Broadbent et al., 1982). Although previous studies have extensively examined the physical and neurological consequences of betel quid consumption, limited research has focused on its impact on everyday cognitive functioning. Existing evidence suggests that long-term use may lead to structural and functional brain changes that affect attention and executive processes (Sariah et al., 2019; Huang et al., 2020). However, the relationship between betel quid dependence and real-life cognitive failures remains underexplored. Furthermore, young adulthood is a critical developmental stage characterized by increased cognitive demands, particularly among college-going individuals who are required to sustain attention, process information, and manage academic workload. Differences in environmental demands between college-going and working young adults may influence the manifestation of cognitive difficulties. However, comparative research examining these groups in relation to betel quid dependence and cognitive failures is scarce. Thus, the study focused on to to examine the association of betel quid dependence and cognitive failures, and investigate their relationship, and compare these variables between college-going and working young adults in Assam.

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Lee, Chang, Shieh, and Chang (2012), in their study titled *"Development and validation of the Betel Quid Dependence Scale,"* developed the Betel Quid Dependence Scale using DSM-IV criteria. The study was conducted on a sample of 498 betel quid users selected through purposive sampling. The findings demonstrated high internal consistency (α = 0.92) and identified key components of dependence such as craving, tolerance, and withdrawal, establishing the scale as a reliable tool for assessing betel quid dependence. **Broadbent, Cooper, FitzGerald and Parkes (1982),** in their study *"The Cognitive Failures Questionnaire and its correlates,"* introduced the Cognitive Failures Questionnaire to measure everyday lapses in attention, memory, and action. The study used a survey method with participants drawn from the general population. The findings indicated that cognitive failures are common in daily life and are strongly associated with reduced attentional control and cognitive inefficiency. **Chu (2001)**, in the study *"Effects of betel chewing on the central and autonomic nervous systems,"* used neurophysiological and behavioral assessments on samples of betel quid users through observational and experimental approaches. The findings revealed that betel quid consumption produces short-term stimulating effects such as increased alertness; however, prolonged use may negatively affect cognitive efficiency and neural functioning. **Huang, Lin, and Lee (2020)**,in their study *"Brain connectivity alterations in betel quid users,"* employed neuroimaging techniques (fMRI) on habitual betel quid users selected through purposive sampling. The findings showed altered functional connectivity in brain regions associated with attention and executive functioning, suggesting potential cognitive impairment among users. **Tung, Chang and Wu (2015)**, in the study *"Arecoline-induced oxidative stress in neuronal cells,"* used laboratory-based cellular and biochemical analysis on experimental neuronal cell models. The findings indicated that prolonged exposure to arecoline leads to oxidative stress and neuronal damage, which may impair memory and learning processes. **Sariah, Lim and Tan (2019)**, in their study *"Structural brain changes in betel quid users,"* utilized brain imaging techniques on habitual betel quid users selected through purposive sampling. The findings revealed structural changes in brain areas related to cognitive control, indicating possible deficits in attention regulation and executive functioning. **Kane, and Engle (2002)**, in their study *"The role of working memory in attention control,"* used experimental tasks measuring working memory

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and attentional processes on controlled samples. The findings showed that individuals with lower working memory capacity exhibited reduced attentional control, leading to increased cognitive failures in daily functioning. **Eysenck, Derakshan, Santos and Calvo (2007),** in their study *"Anxiety and cognitive performance: Attentional Control Theory,"* used cognitive performance tasks and anxiety measures in experimental settings. The findings suggested that increased cognitive load and anxiety reduce attentional efficiency, resulting in higher frequency of cognitive errors and failures. **Winstock, Trivedy, Warnakulasuriya and Peters (2000)**, in their study *"Betel quid dependence syndrome,"* used dependence assessment scales and behavioral questionnaires on betel quid users selected through purposive sampling. The findings indicated that users experience withdrawal symptoms such as irritability and difficulty concentrating, reflecting psychological dependence that may interfere with cognitive functioning. **Kumar, Shrestha and Sarma (2023)**, in their study *"Assessment of areca nut use and dependency among people in Guwahati, Assam,"* used the Betel Quid Dependence Scale along with structured questionnaires on a sample of 479 participants selected through purposive sampling. The findings revealed a high prevalence of betel quid use and significant levels of dependence, particularly among younger individuals, with frequent consumption patterns.

Existing research has established that betel quid use leads to dependence characterized by craving, tolerance, and withdrawal (Lee et al., 2012; Winstock et al., 2000), and is associated with neurocognitive changes such as altered brain connectivity, structural abnormalities, and oxidative stress affecting attention, memory, and executive functioning (Huang et al., 2020; Tung et al., 2015; Sariah et al., 2019). At the same time, studies on cognitive failures have shown that everyday lapses in attention and memory arise from reduced attentional control and working memory limitations (Broadbent et al., 1982; Kane & Engle, 2002; Eysenck et al., 2007). However, these two domains have largely been studied independently, with limited research directly examining the relationship between betel quid dependence and everyday cognitive failures in real-life contexts. Furthermore, there is a lack of focused research on young adults aged 18–25 years, and comparative analysis between college-going and working individuals remains underexplored. Therefore, the present study addresses this gap by investigating the association between betel quid dependence and

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cognitive failures and comparing these variables among college-going and working young adults in Assam

The variables of the study are-

- Independent Variable (IV): **Betel Quid Dependence:** Refers to the level of psychological and behavioral reliance on betel quid, including craving, tolerance, and withdrawal symptoms, as measured using the Betel Quid Dependence Scale (Lee et al., 2012).
- Dependent Variable (DV): **Cognitive Failures:** Refers to everyday lapses in attention, memory, and action (e.g., forgetfulness, distraction, and errors in routine tasks), measured using the Cognitive Failures Questionnaire (Broadbent et al., 1982).
- Young Adults: Individuals aged 18–25 years (World Health Organization, 2014).
- College-Going Young Adults: Individuals aged 18–25 years currently enrolled in undergraduate education.
- Working Young Adults: Individuals aged 18–25 years engaged in part-time or full-time employment (International Labour Organization, 2015).

OBJECTIVES

1. To assess the level of betel quid dependence among college-going and working young adults in Assam.
2. To examine the level of cognitive failures among college-going and working young adults in Assam.
3. To study the relationship between betel quid dependence and cognitive failures.
4. To compare betel quid dependence and cognitive failure levels between college-going and working young adults.

HYPOTHESES

H1: There is a significant difference between betel quid dependence among college-going and working young adults.

H2: There is a significant difference between cognitive failures among college-going and working young adults.

H3: There is a significant positive relationship between betel quid dependence and cognitive failures.

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H4: There is a significant positive relationship with young adults showing higher level of betel quid dependence exhibit greater cognitive failures then with lower dependence.

METHOD

The method adopted in this study follows a descriptive approach, focusing on the systematic collection of quantitative data from young adults who consume betel quid. As a descriptive study, the method emphasizes observing naturally occurring behaviors without introducing any manipulation or intervention.

Research Design

The present study adopts a descriptive research design. A descriptive design helps in understanding and summarizing the existing patterns of betel quid consumption among young adults. It focused on describing the present condition rather than manipulating any variable. The present was also intended to study the relationship between betel quid dependency and cognitive failures.

Population

The population for the present study comprised young adults aged 18–25 years residing in the Kamrup Metropolitan District of Guwahati, Assam, including both college-going students and non–college-going working youth.

Inclusion criteria: Young adults aged 18–25 years residing in Kamrup Metro who had been consuming betel quid for at least one year, were able to read and understand English, and voluntarily provided informed consent.

Exclusion criteria: Individuals outside the age range, non-users of betel quid, those with less than one year of consumption history, individuals with diagnosed neurological or severe psychiatric conditions, or those taking medications affecting cognition were excluded.

Sample

The study employs a purposive sampling technique. This method is chosen because it allows the researcher to intentionally select individuals who meet specific inclusion criteria, young adults (18–25 years) which include college going and working young adults who consume areca nut or betel quid for at least one year.

The participants were selected on the basis of criteria mentioned as follows-

1. All the participants must be between the age group (18 to 25 years).

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2. The participants who have the habit of areca nut consumption.

A total of one hundred (100) participants were taken. Out of 100 participants, fifty (50) participants were college students (Undergraduate students) and 50 were working youths. This number is suitable for beginner-level psychological research and allows for manageable yet statistically meaningful data analysis.

Tools

1. Betel Quid Dependency Scale (BQDS): The Betel Quid Dependency Scale (BQDS), developed by Chen-Yi Lee, Chin-Shun Chang, Tien-Yu Shieh, Yong-Yuan Chang (2012), was used to assess the level of dependence on areca nut or betel quid among participants. The scale contains 16 items.The Betel Quid Dependence Scale is a validated 16-item instrument designed to assess dependence among betel quid users. Each of the 16 items is scored dichotomously as 0 for "No" and 1 for "Yes," yielding a total score ranging from 0 to 16. Higher scores reflect greater severity of betel quid dependence and are indicative of maladaptive use patterns [Lee et al., 2012]. A total score of 4 or above is established as the clinical cut-off for identifying dependence [Lee et al., 2012; other sources]. The scale demonstrates good internal consistency and has been validated across multiple populations, including Asian betel quid users [Lee et al., 2012]**.**

2.Cognitive Failures Questionnaire (CFQ): The Cognitive Failures Questionnaire (CFQ), developed by Broadbent, Cooper, Fitzgerald, and Parkes (1982), was used to measure the self-reported frequency of cognitive lapses in daily life. The CFQ consists of 25 items, each rated on a 5-point Likert scale ranging from *0 (never)* to 5 (very often)

Procedure

Permission was obtained from the head of department of the institution's department before initiating the data collection process. After receiving approval, the participants were approached individually, and their informed consent was taken prior to the administration of the test. The participants were clearly instructed on how to fill out the questionnaire. They were informed that there was no time limit for completing the form and that they were free to ask for clarification if they experienced any doubt regarding the statements or items of the scale. The purpose of the test was explained to the participants, and they were assured that all information provided by them would be kept strictly confidential and used only for research

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purposes. Participation was completely voluntary. After the completion of the questionnaire, the participants were thanked for their cooperation and time, and the session was concluded politely.

Data Analysis

Objective 1: To assess the level of betel quid dependence among college-going and working young adults in Assam

Table 1:

Level of Betel Quid Dependence among College-Going and Working Young Adults

Group	N	Mean (Betel Quid Dependence Scale)	Range	Level
College-Going Young Adults	43	4.74	0–16	Dependent
Working Young Adults	50	3.98	0–16	Low–Moderate

BQDS = Betel Quid Dependence Scale, N = Number of Participants

As demonstrated in table1, the data indicates the level of betel quid dependence for a total of N = 93 participants. The overall mean score was M = 4.41, indicating the presence of dependence among participants.

Group-wise analysis showed that:

- College-going youth (Group 1, N = 43) had a mean score of M = 4.74
- Working youth (Group 2, N = 50) had a mean score of M = 3.98

Ho1: There is a significant difference in the level of betel quid dependence between college-going and working young adults in Assam.

Table 1.2

Mean Difference in Betel Quid Dependence between College-Going and Working Young Adults

Group	N	Mean (BQDS)	t-value	p-value
College	43	4.74		
Working	50	3.98	0.44	0.265

BQDS = Betel Quid Dependence Scale; N = Number of participants.

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As demonstrated in Table 1.2, college-going young adults (M = 4.74) reported slightly higher betel quid dependence than working young adults (M = 3.98). However, the obtained p-value (0.265) is greater than the level of significance (0.05), indicating that the difference is not statistically significant. Hence the Ho1 is rejected

Objective 2: To examine the level of cognitive failures among college-going and working young adults in Assam

Table 2.1:

Level of Cognitive Failures among College-Going and Working Young Adults

Group	N	Mean (CFQ)	Range	Level
Overall	93	37.57	0–100	Moderate
College	43	41.63	0–100	Moderate (Upper Range)
Working	50	34.50	0–100	Moderate (Lower Range)

CFQ = Cognitive Failures Questionnaire; N = Number of participants. Scores ranging from 31–60 indicate a moderate level of cognitive failures.

The result of table 2.1 states that all groups fall within the moderate range (31–60), indicating a noticeable presence of cognitive failures. However, the college group lies in the upper moderate range, suggesting more frequent lapses in attention, memory, and action. The working group shows relatively lower scores, indicating better everyday cognitive functioning compared to students.

Ho2: There is a significant difference in the levels of cognitive failures between College Going and Working Young Adults in Assam

Table 2.2

Mean Difference in Cognitive Failures between College-Going and Working Young Adults

Group	N	Mean (CFQ)	t-value	p-value
College	43	41.63		
Working	50	34.50	2.34	0.021

CFQ = Cognitive Failures Questionnaire; N = Number of participants.

As demonstrated in Table 2.2, college-going young adults (M = 41.63) showed higher cognitive failures than working young adults (M = 34.50). The p-value (0.021) is less than

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0.05, indicating that the difference is statistically significant. Hence, Hypothesis 2 is accepted.

Objective 3: To study the correlation between betel quid dependence and cognitive failures among college going and working young adults.

Table 3.1:

Correlation between Betel Quid Dependence and Cognitive Failures

Group	N	r	p	Interpretation
Overall	93	-0.015	0.891	Negligible, Not Significant
College	43	0.133	0.397	Weak Positive, Not Significant
Working	50	-0.250	0.094	Weak Negative, Not Significant

r = Pearson correlation coefficient; p = level of significance; N = Number of participants. A p-value greater than 0.05 indicates a non-significant relationship.

The findings of the table 3.1 demonstrated Pearson correlation analysis for N = 93 participants that revealed:

- Overall: r = -0.015, p = 0.891
- College: r = 0.133, p = 0.397
- Working: r = -0.250, p = 0.094

The results show that there is no statistically significant relationship between betel quid dependence and cognitive failures ($p > 0.05$). Although the college group shows a weak positive trend, it is not significant. Similarly, the working group shows a weak negative trend. Thus, dependence alone does not significantly explain cognitive

Ho3: There is a significant positive relationship between betel quid dependence and cognitive failures among young adults in Assam.

As demonstrated in Table 3.1, the overall correlation between betel quid dependence and cognitive failures is negligible (r = -0.015) and not statistically significant (p = 0.891). However, among college-going young adults, a weak positive correlation (r = 0.133) is observed, though it is not statistically significant. The working group shows a weak negative correlation (r = -0.250), which is also not significant. Hence, Hypothesis 3 is rejected, although a weak positive trend is observed among college-going youth.

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Objective 4: To compare Betel Quid Dependence and Cognitive Failures levels between college-going and working youth

Table 4.1

Comparison of Betel Quid Dependence and Cognitive Failures between College-Going and Working Young Adults

Variable	Group	N	Mean	t	p	Inference
BQDS	College	43	4.74	0.44	0.265	Not Significant
	Working	50	3.98			
CFQ	College	43	41.63	2.34	0.021	Significant
	Working	50	34.50			

BQDS = Betel Quid Dependence Scale; CFQ = Cognitive Failures Questionnaire; *t* = t-test value; *p* = level of significance; N = Number of participants.

The result of table 4.1 states that Independent samples t-test results:

- BQDS: t = 0.44, p = 0.265 (Not significant)
- CFQ: t = 2.34, p = 0.021 (Significant)

There is no significant difference in dependence levels between the two groups. However, cognitive failures are significantly higher in college-going youth, indicating that students experience more cognitive difficulties despite similar levels of dependence. Higher betel quid dependence is associated with higher cognitive failures among young adults.

Ho4: Their is a significant positive relationship with Young adults showing higher level of betel quid dependence exhibit greater cognitive failures then with lower dependence.

As demonstrated in Table 4.1, college-going young adults reported higher mean scores for both betel quid dependence (M = 4.74) and cognitive failures (M = 41.63) compared to working young adults (M = 3.98 and M = 34.50, respectively). This indicates a descriptive pattern where higher dependence is associated with higher cognitive failures among college students. However, the difference in betel quid dependence between the two groups is not statistically significant (p = 0.265), whereas the difference in cognitive failures

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is statistically significant (p = 0.021). Furthermore, correlation analysis (Objective 3) showed no significant relationship between dependence and cognitive failures. Hence, Hypothesis 4 is supported for the case of college going youth at a descriptive level but not statistically supported so the hypothesis is rejected.

Discussion

The first objective of the study examined the level of betel quid dependence among young adults. The findings indicated a moderate level of dependence among participants, with slightly higher mean scores observed among college-going youth compared to working individuals. However, the difference was not statistically significant. This suggests that betel quid consumption is a commonly normalized behavior across both groups, likely influenced by cultural acceptance and easy accessibility in Assam. These findings are consistent with previous research highlighting the widespread use of areca nut and betel quid in Northeast India due to strong socio-cultural reinforcement (Gupta & Warnakulasuriya, 2002; Warnakulasuriya, 2009).

The second objective focused on examining the level of cognitive failures among participants. The results revealed that cognitive failures were significantly higher among college-going youth compared to working individuals. This finding is particularly important, as it indicates that students may be more vulnerable to everyday lapses in attention, memory, and action. One possible explanation lies in the cognitively demanding nature of academic environments, which require sustained attention, information processing, and multitasking. According to Attentional Control Theory, increased cognitive load and anxiety can impair attentional regulation, leading to greater cognitive failures (Eysenck et al., 2007). Similarly, limitations in working memory and executive attention may contribute to higher error rates under demanding conditions (Kane & Engle, 2002). Thus, even moderate disruptions in cognitive functioning may become more noticeable among college-going individuals.

The third objective examined the relationship between betel quid dependence and cognitive failures. The findings showed no statistically significant correlation between the two variables. This suggests that dependence alone may not directly predict cognitive inefficiency in everyday functioning. Cognitive failures are known to be influenced by multiple interacting factors such as stress, fatigue, and attentional capacity rather than a

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single variable (Broadbent et al., 1982). Although a weak positive trend was observed among college-going youth, it was not statistically significant. This may indicate that dependence could interact with situational demands, particularly in environments that require higher cognitive engagement, rather than having a direct linear effect on cognitive functioning.

The fourth objective compared betel quid dependence and cognitive failures between college-going and working young adults. While dependence levels did not differ significantly, cognitive failures were significantly show weak positive trend among college-going youth. The weak positive trend observed among college-going youth suggests a possible emerging relationship under conditions of higher cognitive demand. This highlights an important distinction: similar levels of substance use may result in different cognitive outcomes depending on environmental demands. Research has shown that prolonged exposure to substances such as areca nut may affect brain regions associated with attention and executive functioning, although these effects may become more evident under cognitively demanding conditions (Huang et al., 2020; Tung et al., 2015). Therefore, the academic context may amplify the impact of even subtle cognitive inefficiencies among students.

Overall, the findings emphasize that college-going youth represent a more cognitively vulnerable group despite having similar levels of betel quid dependence as working individuals. This suggests that cognitive failures are not solely determined by substance dependence but are influenced by the interaction between behavioral habits and situational cognitive demands. The results underscore the importance of focusing on college students in future research and intervention strategies, particularly in regions like Assam where betel quid use is culturally normalized.

Conclusion

The present study examined the relationship between betel quid dependence and cognitive failures among young adults in Assam and found that, although participants showed moderate levels of dependence, no statistically significant relationship existed between betel quid dependence and cognitive failures. However, a significant difference was observed between groups, with college-going young adults reporting higher levels of cognitive failures compared to working individuals. This indicates that cognitive difficulties in everyday

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functioning may be more pronounced in academic contexts, possibly due to higher cognitive and attentional demands rather than dependence alone. Although a weak positive trend was observed within the college group, it was not statistically significant. Overall, the findings highlight the importance of addressing cognitive functioning and promoting awareness regarding substance use and cognitive well-being among young adults, particularly within college settings

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