

Evaluation of female breast cancer risk among the betel quid chewer: A bio-statistical assessment in Assam, India

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Abstract:

Background: Breast cancer is the most commonly diagnosed cancer among the female population of Assam, India. Chewing of betel quid with or without tobacco is common practice among female population of this region. Moreover the method of preparing the betel quid is different from other parts of the country. So matched case control study is conducted to analyse whether betel quid chewing plays a significant role in the high incidence of breast cancer occurrences in Assam.

Methods and Material: Here, controls are matched to the cases by age at diagnosis (± 5 years), family income and place of residence with matching ratio 1:1. Conditional logistic regression models and odd ratios (OR) was used to draw conclusions.

Results: It is observed that cases are more habituated to chewing habits than the controls. Further the conditional logistic regression analysis reveals that betel quid chewer faces 2.353 times more risk having breast cancer than the non-chewer with p value 0.0003 (95% CI 1.334-4.150).

Conclusion: Though the female population in Assam usually does not smoke, the addictive habits typical to this region have equal effect on the occurrence of breast cancer.

Keyword: Breast Cancer, Betel Quid, Matched Case Control Study, Conditional Logistic Regression, Odds ratio

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Introduction

Breast cancer is the most common female cancer in India and the rate is increasing rapidly and steadily. North East Population Based Cancer Registry, 2011 report that breast cancer is the highest incidence cancer in the three districts Kamrup Urban, Dibrugarh, and Cachar of Assam with age adjusted incidence rate 22.8, 10.6, 16.4 respectively[1]. Earlier epidemiological studies have suggested that tobacco smoking and carcinogens increases the risk of developing breast cancer[2,3]. Assam is one of the states of North East India where the female population generally does not smoke but they are habituated to chewing habits like chewing of betel nut, tobacco. Consumption pattern of betel quid in Assam is entirely different from other parts of the country. Here betel nut is popularly known as a “Tamul”. However “Tamul” as such is not consumed here and varieties like “Bura Tamul (fermented)”, “Raw (green)”, “Ripe (red)” and other treated varieties are more popular. The people with chewing habits consume betel quid as a combination of chopped or crushed betel nut; slaked lime (calcium oxide) wrapped in betel leaf and with or without tobacco. ‘Dhapat’, dried tobacco leaf that may be treated with lime (calcium oxide), is sometimes added to the betel nut in the quid while finely cut, scented tobacco (‘Zarda’) is also chewed[4]. In a previous case control study on the impact of consumption of Betel Quid (BQ) on environmental and genetic factors of the North East Indian population it was revealed that there was a significant rise in the risk of occurrence of breast cancer due to the same[5]. Another research was done on genomic alterations of breast cancer patients who were either exposed to BQ chewing or not. This study revealed that breast cancer arising by environmental carcinogens illustrates a difference in the two groups of the patients. This study further exposed that both the tumour groups shared a number of genetic changes considered as crucial in breast cancer progression[6]. The main purpose of the present study is to add epidemiological research work to the limited literature of association of chewing habits that are practised among the female population of Assam and high incidence breast cancer, including the frequency of consumption and the habit of adding tobacco to the quid, presumed to increase the risk of the cancer further.

Methods and material:

Study design and participants

A matched case control study design was adopted for the study to eliminate the effect of some confounding factors like age, income and place of residence. Controls are matched to the cases by age (± 5 years), monthly family income, place of residence and the matching ratio was 1:1. For the cases all the data are collected from Out Patient Department of Dr. B.

Borooh Cancer Research Institute. Being the regional cancer care and research institute of Assam, the institute is the main source of data on cancer for the whole North East Region of India.

Data collection

For the cases, data were collected from August, 2011 to February, 2012 during which 158 new cases of the breast cancer were diagnosed. The data for the controls were collected from respondents who came to the preventive oncology department of the institute for breast cancer screening but were not diagnosed with breast cancer and from the community having same economic status. The Interview Schedule for data collection was pre tested with respondents to check whether it would provide the valid and reliable information required for this study[7]. These were not included in the final analysis.

Inclusion criteria:

Only histopathologically confirmed female (both married and unmarried) cases of breast cancer belonging to different districts of Assam are included in the present study.

Exclusion criteria:

Male breast cancer patients are excluded from the study.

Sample size:

Out of the 158 registered breast cancer patients, male patients ($n=7$), patients from outside Assam ($n=15$), those who were too old to be interviewed ($n=8$), who refused to be interviewed elaborately ($n=8$) and from whom we were not able to complete the information ($n=19$) due to lack of communication address were excluded from the study. Finally a total of 100 pair of case and controls were included in the study and analysis was done based on the information given by those respondents.

Ethical committee approval:

Approval for the study is obtained from the institutional research ethical committee, IASST.

Data management and statistical analysis:

Association between habits of betel quid chewing and breast cancer occurrences evaluated using conditional logistic regression models. Conditional maximum likelihood method was used to estimate the conditional probability variables of regression models due to matched design and significance was taken at $p \leq 0.10$. Relationships is measured using odd ratios (OR) and their 95 percent confidence intervals (CI). Analysis was carried out using SPSS version 18.

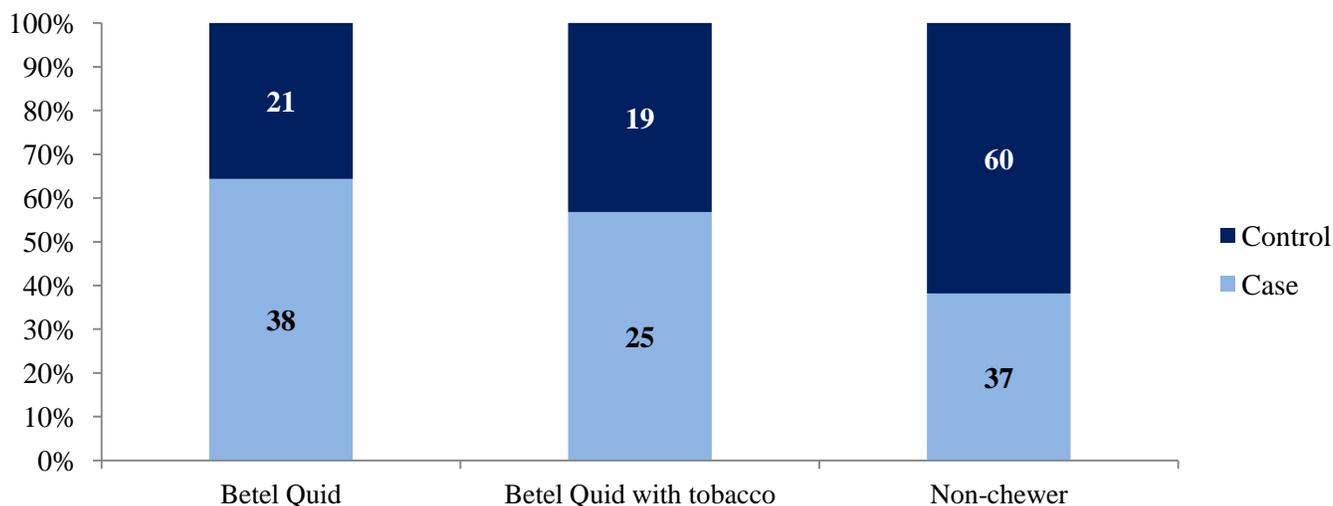
Results:

The mean age is 45.50 for the cases and 43.35 for the controls. Applying independent sample t test, we observe that there is no statistical significant difference between the age pattern of the cases and controls (here $p = 0.164$ which is insignificant so we accept the null hypothesis). This suggests that age

matching is perfect and that the efficiency of the results is expected to be enhanced. Among the 100 pairs of case control group, 43 pairs belong to the less than or equal to INR 10000

family income group. Majority of the pair (52 pair) were from rural region of the study area.

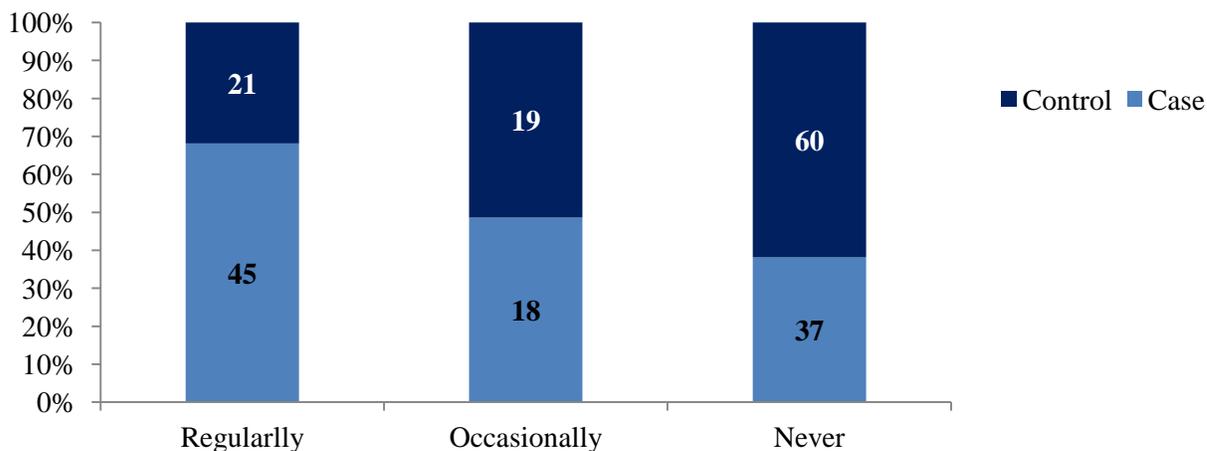
Fig 1: Percentage of the case & control related to chewing pattern



Although the data were collected from the same environment of the study area, it was seen that 63 percent of the case group were habitual betel quid chewers in comparison to only 40

percent of the controls who have this habit. Percentages of the type of chewing habits that are chewed by the respondents are depicted in Figure 1.

Fig 2: Percentage of the case & control related to nature of chewing



Further, as depicted in Figure 2, higher percentages of the respondents within the case group (45 percent) consume betel quid regularly and very small amounts (18 percent) of the cases consume it occasionally.

The risk associated with different pattern and natures of chewing are shown in the Table 1. It has been proved in our study that those women who have chewing habits are 2.353 more prone to have breast cancer compared to those without chewing habits and is significant at 1 percent level of significance ($p=0.003$). When the respondent consume only betel quid then the odds ratio is 2.028 ($p= 0.062$) but the odds ratio increases to 2.595 ($p=0.005$) for those respondent who had been using betel quid with tobacco. And the chewers have 4.126 times ($p=0.000$) more chance to have breast cancer when they consume it regularly.

Table 1: Odds Ratio and 95% Confidence Interval for chewing habits, pattern and nature

	Case n (%)	Control n (%)	OR (95% CI)	p value
Chewing habits				
Chewer	63 (63)	40 (40)	2.353 (1.334-4.150)	0.003
Non-chewer	37 (37)	60 (60)	1	
Chewing pattern				
Betel quid	38 (38)	21 (21)	2.028 (0.964-4.267)	0.062
Betel quid with tobacco	25 (25)	19 (19)	2.595 (1.344-5.012)	0.005
Non-chewer	37 (37)	60 (60)	1	
Nature of chewing				
Regularly	45 (45)	21 (21)	4.126 (1.882-9.050)	0.000
Occasionally	18 (18)	19 (19)	1.218 (0.567-2.617)	0.612
Never	37 (37)	60 (60)	1	

OR: Odds ratio; CI: Confidence Interval

Discussion:

The North East Indian population is estimated to be at high risks for Oesophageal, gastric and oral cancers due to its high incidence of tobacco and betel nut consumption[5]. The present study establishes that betel quid chewing, with or without tobacco, is a significant risk factor for breast cancer too in the state Assam of north east India. So it signifies that addictive habits typical to different regions may have equal effect on the occurrence of breast cancer. The results obtained in the present epidemiological work along with similar results [5, 6] published by other studies may provide baseline information for further research studies on this area, as betel quid chewing along with tobacco chewing has not been showing to be a risk factor for breast cancer in other parts of the country.

In this study we do not have the effect of confounding factor as it is eliminated by matching criteria of cases to the control. And though we conduct this study with limited sample group but it will be beneficial to plan studies to be carried out with larger sample group.

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Conflict of interest:

The authors hereby declare that they have no financial or non-financial potential conflicts of interest.

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