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Original Article

Association of Betel Leaf Chewing and Use of Tobacco with Development of Oral Cancer

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Abstract:

Background : Oral cancer is the 11th most common cancer in the world, 3rd most in Indian sub-continent and 20% of all cancer in Bangladesh. Oral cancer is increased with chewing betel leafwith or without tobacco. Approximately 90% of oral cancer can be attributed to tobacco chewing and smoking habits.

Objectives : This study was conducted to find out the association of betel leaf chewing and use of tobacco with development of oral cancer.

Methods : A hospital based case-control study was conducted on 204 patients (68 cancer patient as case and 138 subjects as control), 119 male and 85 female, age ranged from 18 to 80 years, attending at National Institute of Cancer Research and Hospital, Mohakhali, Dhaka over the period of one year, from July 2007 to June 2008. A pre-tested questionnaire was used to collect data by face-to-face interview of the respondents. Chi-square test and t-test were done to cheek for statistical significant association between different variables.

Results : Statistically significant association was found between betel quid chewing habit and development of oral cancer. Significant association also was found between use of tobacco and development of oral cancer.

Conclusion : Public health initiative should be taken to prevent use of tobacco and chewing betel leaf to prevent oral cancer.

Key word : Betel leaf, tobacco, Oral cancer

Introduction :

Oral cancer is one of the most common cancers in the world, with two-third of the cases occurring in the developing countries[1]. Oral cancer is becoming a pressing problem in the world and the WHO predicts a continuing worldwide increase in the number of patient with oral cancer[2]. Oral cancer is one of the most common cancers in the world with approximately 127500 deaths occurring each year. Oral cancer is the 11th most common cancer in the world, 3rd most in Indian sub-continent[3] and 20% of all cancer in Bangladesh.[4,5]

Pan chewing is an integral part of the culture of Asian people. Amongst South Asian people this habit is based on the historical use of the substance and also on the wide availability and low cost.[6] Tobacco was introduced to South Asia in the 17thcentury. Areca nut is carcinogenic to humans and the risk of oral cancer is increased with chewing pan without tobacco, although the risk is higher for pan containing tobacco.[7-9] Chewing tobacco is widely used in betel quid among south Asian people. In Bangladesh, the common form of chewing tobacco used in betel quid is Jarda. Jarda is a crushed leaf of cured tobacco.[10] Among Bangladeshi adult, the prevalence rate of smoking among males is 48.3 and among female it is 20.9.

In South and South-East Asian countries chewing and smoking of tobacco is responsible for one third of all cancers.[11]Approximately 90% of oral cancer in South and South-East Asia can be attributed to tobacco chewing and smoking habits. The highest risks occur in people who use tobacco by incorporating it in the betel quid and also by smoking.[12]Pan and

betel is usually taken with other ingredient like areca nut, tobacco, catechu and others. It is experimentally shown that the areca nut and tobacco contain carcinogens, which cause DNA damage.[13] Tobacco also causes immune suppression, which is responsible for impaired cancer pathogenesis of oral sub mucous fibrosis which has a potential for malignant changes. Slaked lime, an injurious agent helps in the liberation of carcinogenic alkaloid from tobacco.[14] The widespread habit of smoking and use of tobacco, particularly in combination with betel chewing, among Bangladeshis may attribute to oral cancer as well as periodontal diseases.[15,16]

Etiology of malignancy is complex and multifactorial. It is suspected that in India widespread malnutrition together with betel chewing may contribute to the high incidence of Oral squamous cell carcinoma. According to other studies tobacco causes carcinogenesis by releasing oxidative free radical gene mutation and tumor progression. In Bangladesh high incidence of laryngeal squamous cell carcinoma is seen in low socioeconomic group of betel chewer.[14]

The aim of this study was to find out the association of betel leaf and use of tobacco with development of oral cancer. It will help to organize preventive programs and evolution of oral cancer control activities.

Methods :

A hospital based case-control study was conducted among 204 patients (68 cancer patient as case and 138 subjects as control), 119 male and 85 female, age ranged from 18 to 80 years, attending at National Institute of Cancer Research and Hospital, Mohakhali, Dhaka over the period of one year, from July 2007 to June 2008. A pre-tested questionnaire was used to collect data by face-to-face interview of the respondents through. The collected data were analyzed with Statistical Packaged for Social Sciences (SPSS) for Windows version 11.5. Chi-square test and t-test were done to cheek for statistical significant association between different variables. $P<0.05$ was considered to be statistically significant. Odds Ratio was calculated where Chi-square tests were significant to see the strength of association.

Results :

Regarding, pan chewing habit around 80% of the cases told that they have the habit. Among the controls 53.7% had the habit. Statistically a significant difference was found between the pan chewing and development of oral cancer (table-I).

Table-I: Distribution of the respondent by pan chewing habit (n=204)

Pan chewing habit of the respondent	**Case n (%)**	**Control n (%)**	**Total n (%)**	**P value**	**OR**	**95% CI**
Yes	53(77.9)	73(53.7)	126(61.8)	0.001	3.049	1.568 to 5.929
No	15(22.1)	63(46.3)	78(38.2)			
Total	68(100)	136(100)	204(100)			
Pan chewing habit of the respondent	Case n (%)	Control n (%)	Total n (%)	P value	OR	95% CI
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Total	68(100)	136(100)	204(100)			

P value reached from χ^2test

Around 80% of the respondents chewed betel leaf for less than or equal to 20 years. In each group 9% respondents chewed betel leaf for 20-30 years. Statistically a significant difference found between oral cancer and duration of pan chewing habit (table-II).

Table-II: Distribution of the respondents by duration of pan chewing habit (n=126)

Duration Of betel nut chewing habit (in year)	**Case** n (%)	**Control** n (%)	**Total** n (%)	**P value**
≤20	39(73.6)	62(84.9)	101(80.2)	0.006
21-30	9(17.0%)	9(12.3)	18(14.3)	
>30	5(9.4)	2(2.7)	7(5.6)	
Total	53(100)	73(100)	126(100)	
Mean ± SD (Year)	19.5±8.866	15.3±7.859		

P-value reached from unpaired t-test

Among the cases 24(45.3%) chewed pan for more than 10 times per day. Thirty percent of the Controls and 47.2% of the cases gave pan chewing history for 6-10 times per day. A significant statistical difference found between frequency of pan chewing and oral cancer (table-III).

Table-III: Distribution of the respondents by frequency of pan chewing habit (n=126).

Frequency of betel leaf(pan) chewing	**Case** n(%)	**Control** n(%)	**Total** n(%)	**P value**
≤5	4(7.4)	31(42.5)	35(27.8)	0.000
6-10	25(47.2)	27(37.0)	52(41.3)	
>10	24(45.3)	15(20.5)	39(31.0)	
Total	**53(100)**	**73(100)**	**126(100)**	
Mean ± SD (frequency)	10.96± 3.664	8.44± 3.930		

P-value reached from unpaired t-test

Among the respondents, 73.5%of cases chewed tobacco with betel leaf 73.5% of the cases told positive answer;and36% of controls took chewing tobacco with betel leaf. Statistically a significant difference was found between tobacco use and development of oral cancers (table-IV).

Table-IV: Distribution of the respondent by tobacco chewing habit (n=204)

Tobacco chewing	**Case** n (%)	**Control** n (%)	**Total** n (%)	**P Value**	**OR**	**95% CI**
Yes	50(73.5)	49(36.0)	99(48.5)	0.000	4.932	2.594 to-9.377
No	18(26.5)	87(64.0)	105(51.5)			
Total	**68(100)**	**136(100)**	**204(100)**			

P value reached from χ^2test

More than 50% of the controls did not keep betel leaf in mouth over night. Among cases, 13(24.5%) did not keep betel leaf over night, 15(28.3%) kept chew and 25(47.2%) occasionally kept chew over night. Around 33% of the controls gave history of keeping betel leaf in mouth over night. Statistically a significant difference was found between keeping chewing tobacco in mouth over night and development of oral cancer (table-V).

Table-V: Distribution of the respondent by habit of keeping betel leaf in mouth over night (n=126)

Keeping tobacco in mouth over night	**Case** n (%)	**Control** n (%)	**Total** n (%)	**P value**	**OR**	**95% CI**
Chewing does not keep	13(24.5)	37(50.7)	50(39.7)	0 .012	0.316	0.14-0.68
Chewing keep	15(28.3)	12(16.4)	27(21.4)			
Occasionally keep	25(47.2)	24(32.9)	49(38.9)			
Total	**53(100)**	**73(100)**	**126(100)**			

P value reached from χ^2test

About smoking habit, 54.4% of the cases and 35.3% of the controls are habituated with smoking. Statistically a significant difference was found between tobacco use and the development of oral cancer (table-VI)

Table-VI: Distribution of the respondents by smoking habit (n=204)

Smoking habit	Case n (%)	Control n (%)	Total n (%)	P value	OR	95% CI
Yes	37(54.4)	48(35.3)	85(41.7)	0.009	2.188	1.210 to 3.959
No	31(45.6)	88(64.7)	119(58.3)			
Total	**68(100)**	**136(100)**	**204(100)**			

P value reached from χ^2test

The mean duration of tobacco consumption by cases and controls were 23.62(±11.046) years and 20.94(±8.596) years respectively. There is no significant difference between oral cancer and duration of tobacco use.Duration of smoking is 2.7 years more among cases than controls (table-VII).

Table-VII: Distribution of the respondents by duration of smoking habit (n=85)

Smoking duration (years)	Case n (%)	Control n (%)	Total n (%)	P Value
<20	24(64.9)	27(56.3)	51(60.0)	.211
21-30	7(18.9)	20(41.7)	27(31.8)	
>30	6(16.2)	1(2.1)	7(8.2)	
Total	**37(100)**	**48(100)**	**85(100)**	
Mean± SD (years)	23.62±11.046	20.94± 8.596		

P value reached from t-test

Among the respondents, 48.6% of the cases took more than15 stick per day. The mean number of tobacco stick use among the cases and controls were 16.54(±.5.714) and 13.12(±6.267) per day. There was significant difference between oral cancer and number of tobacco stick use per day (table-VIII).

Table-VIII: Distributions of the respondent by total number of tobacco stick use (n=85)

No. of tobacco stick use per day	Case n (%)	Control n (%)	Total n (%)	P value
<5	2(5.4)	3(6.3)	5(5.9)	
5-10	4(10.8)	19(39.6)	23(27.1)	
11-15	13(35.1)	16(33.3)	29(34.1)	
>15	18(48.6)	10(20.8)	28(32.9)	
Total	**37(100)**	**48(100)**	**85(100)**	
Mean± SD (stick/day)	16.54±5.714	13.12±6.267		**0.013**

Discussion :

In this study 54.4% cases and 45.6% controls were used to smoke tobacco. Among cases the minimum duration of smoking was 10years and maximum was 60 years and among controls it was 2 years and 40 years respectively. In another study it was found that compared to never smoker a higher proportion of man among both case (66%) and controls (59%) had ever smoked[1].

In a study of Brazil it was found that tobacco and alcohol consumption was the strongest risk factors irrespective of the anatomical site.[17] In Gujrat it was found that 85% of the entire population had oral habit in some form. Their most common habit was smoking tobacco alone or in combination with Pan.[18]

In this study, it was found that the mean duration of smoking among case was 23.62 years and among controls 20.94 years.

In Kerala, Southern India, it was found that duration of use was a better predictor of risk than either daily frequency of use or total life time exposure, both for pan-tobacco chewing (especially if they started before age 21 years) and bidi smoking.[19] In another study Franco[17] found a strong correlation between number of pack-years and risk. The RR for the heaviest vs. the lowest consumption categories (>100 vs. <1 pack years) was 14.8. The present study showed the frequency of tobacco smoking was 16.54 stick per day among case and 13.12 stick among controls. In another study in Poland, it was found that risk of oral cancer increase 14-fold among those who consumed more than 15 cigarettes per day.[20] In another study by cancer research UK it was found that risk is dependent on dose and duration of tobacco smoking.[21]

In this study 77.9% cases and 22.1% controls had pan chewing habit. Among cases the minimum duration of betel quid (pan) chewing habit was 7 years and maximum duration was 50 years and among controls it was 2 years and 40 years respectively. In an article it was found that the risk of oral cancer is increased in people who chew quid's even without tobacco, compared with people who do not chew quid at all.[22]The use of chewing tobacco in any form (Jarda, Sadapata, Gul) was 73.5% among cases and among controls it was 36.0%. MuwangeK et.al[1] in another study found that tobacco chewing was the strongest risk factors associated with oral cancer. The adjusted odd ratios for chewers were 3.1(95% CI (CI) = 2.1-4.6) for men and 11.0(95% CI 5.8-20.7) for women. In another study among Asian communities in the UK, Bangladeshis it was found that 14% men and 23% women used pan with tobacco.[21]

At this present study among cases the mean pan chewing year is 19.49 years and among controls is15.30 years. Muwonge et.al[1] found that the highest increased risk estimates were observed among those who had chewed for 20 years or more. In another study, it was found that pan chewing was the most important risk factor, with 31-40 years use. [21] In this study, the mean pan chewing frequency among cases was 10.96 and among controls 8.44 times per day. In another study it was found that the risk of oral cancer is higher among those who had chewed more than five times a day.[1]In an article, it was found that the risk is also increased for them who chew betel quid frequently and continually. It was found that 28.3% cases kept chew in mouth over night and 47.2% cases kept chew in mouth occasionally[22]. Muwonge1[1] found that both keeping and not keeping the quid in the mouth overnight increased the effect of chewing further among both male and female chewer.

This study shows that the risk of developing oral cancer is increased by smoking and betel quid (pan) chewing habit of the respondents. Betel quid chewing habit with or with out tobacco is equally act as a risk factor for development of oral cancer. Findings of this study give emphasis to public health initiatives targeted to prevent smoking and betel quid chewing habits.

Conclusion :

This study shows that the risk of developing oral cancer is increased by betel leaf chewing and use of tobacco. Betel quid chewing habit with or without tobacco is equally act as a risk factor for development of oral cancer. Findings of this study give emphasis to public health initiatives targeted to prevent smoking and betel quid chewing habits.

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