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Habitual Betel Quid Chewing Patterns and the Risk of Oral Potentially Malignant Disorders: Population-Based Case Control Study

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ABSTRACT

Habitual betel quid chewing is known as risk factor of oral potentially malignant disorders. Comprehensive data on the history of usage patterns and the risk of oral mucosal disorders related to the habitual betel quid chewing had previously been limited in numerous Indonesian populations. The purpose of this study was to investigate the risk of habitual betel quid chewing patterns on the oral potentially malignant disorders in Samosir Island, province of North Sumatra Indonesia. The present study was conducted to the habitual chewers of betel quid in the working area of the local government clinic of Ambarita in Samosir Regency, North Sumatra Province, Indonesia. As study group, subjects with oral potentially malignant disorders i.e. submucous fibrosis and leukoplakia, and as control group, subjects without oral potentially malignant and malignant disorders, were assigned into study. The present study revealed the oral potentially malignant disorders were significantly associated with the duration of chewing betel quid more than 25 years (OR= 4.571; p= 0.022), the number of quids consumed per-day more than 6 quids/day (OR= 4.121; p= 0.024), and lifetime exposure of chewing betel quid more than 1.4x104 hours (OR= 4.571; p= 0.022), meanwhile duration of retention of the quid in the mouth more than 40 min/quid associated with the risk of oral potentially malignant disorders (OR= 2.475; p= 0.225). As the conclusion, the risk of oral potentially malignant disorders might increase with the more the subjects practiced in habitual betel quid chewing patterns.

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Introduction

Betel quid chewing habit is widely prevalent in many parts of Asia communities [1,2]. The term 'betel quid' indicates a substance or mixture of substances (in any manufactured or processed form) that wrapped in betel leaf, placed in the mouth where it is sucked or actively chewed, and thus remains in contact with the mucosa over an extended period. It usually contains one or both of two basic ingredients, tobacco or areca nut [3-5].

There is sufficient evidence that both tobacco-added and tobacco-free betel-quid are carcinogenic to humans [3]. Evaluations performed by the International Agency for Research on Cancer (IARC) have shown that duration of betel quid chewing and number of quids consumed per-day, associated with the development and onset of several oral potentially malignant and malignant disorders [3]. Several studies revealed that habitual chewers showed oral mucosal disorders, such as oral submucous fibrosis, oral leukoplakia and oral cancer [6-9].

Habitual betel quid chewing is also commonly practiced in many parts of Indonesia [10]. North Sumatra is one of the province in Indonesia where the betel quid chewing habit has been viewed as publicly acceptable among all strata of its society due to long-standing cultural perspectives [2,3,6]. Comprehensive data on the history of usage patterns and risk of oral mucosal disorders related to the habitual betel quid chewing, had previously been limited in numerous Indonesian populations. Such information is warranted to recognize contemporary problems so as to better facilitate the strategic development of prevention and the control of betel quid related health consequences in this region. The purpose of this study was to investigate the risk of habitual betel quid chewing patterns i.e. duration of chewing, number of quids consumed per-day, duration of retention in the mouth, and lifetime exposure, on the oral potentially malignant disorders in Samosir Island, province of North Sumatra Indonesia.

Material and Methods

Study participants

The present study is a population-based case control study which was conducted to the habitual chewers of betel quid in the working area of the local government clinic of Ambarita in Samosir Regency, North Sumatra Province, Indonesia within a period from August 2016 to December 2016. Habitual chewers of betel quid defined as daily chewers who had the habit for at least six months. A total of 27 chewers with oral potentially malignant disorders, i.e oral submucous fibrosis and oral leukoplakia, who consecutively attended in the study were included as the case group. Same number of age- and sex-matched chewers who attended consecutively to the same clinic were included as controls. Habitual chewers of betel quid with smoking and/or alcohol intake were excluded from the study.

Ethical considerations

Ethical committee clearance approval was obtained from Health Research Ethical Committee of Medical Faculty of Universitas Sumatera Utara/ H. Adam Malik General Hospital. Additionally, informed consent was obtained from volunteer participants [11].

Data collection

The study protocol included a visual oral soft tissue examination and a questionnaire-based interview. The participants were subjected to complete oral examination including buccal mucosa, labial mucosa, tongue, floor of the mouth and palate. The clinical diagnosis was established based on the criteria as provided by the epidemiology guide for the diagnosis of oral mucosal diseases [12-14]. Following diagnosis, the participants were subjected to a performed questionnaire regarding the chewing habits. The lifetime exposure was calculated by the number of quids consumed per-day (in quids/day)* duration of retention of the quid in the mouth (in minutes/quid)*duration of chewing (in years)*365/ 60, in hours [7].

Statistical analyses

Data thus collected was entered in computer using MS Office Excel windows 2007 and analyzed with Statistical Package for the Social Sciences (SPSS) version 20.0, using mean, frequency and standard deviation. Kolmogorov-Smirnov test was used to determine whether the data were normally distributed. Chi square test were adapted to assess differences between case and control groups while stratified by oral potentially malignant and malignant-group categories for various factors. If any expected counts are less than 5.0, then Fisher exact test should be used. All statistical tests were two tailed test. $p< 0.05$ was considered significant. Risk was assessed using univariate odds ratio (OR) with 95% confidence interval.

Results

Demographic characteristics of the participants

The present study was conducted to 50 habitual chewers of betel quid, comprised of 27 oral potentially malignant (case group) and 23 non-oral potentially malignant disorders (control group). The age of the case and control group was similar ($p= 0.155$). All of the participants were woman. Both of groups were commonly used areca nut and tobacco as the major constituents of the quid, 74.1% in oral potentially malignant disorders (case group) and 65.2% in non-oral potentially malignant disorders (control group). The major constituents of the quid of the case and control group was similar ($p= 1.000$). Characteristics of the participants in the present study are presented in Table 1.

Betel quid-related oral mucosal disorders

Considering the ranking of prevalence of lesions in betel quid chewing habit, betel chewer's mucosa was the most prevalent oral mucosal disorder in the two groups, 42.4% in oral potentially malignant disorders (case group) and 60.9% in non-oral potentially malignant disorders (control group). Of all the oral potentially malignant disorders (case group), oral submucous fibrosis (37.5%) was the more common oral mucosal lesion than oral leukoplakia (20.3%). The difference of betel quid-related oral mucosal disorders in both case and control group was statistically significant (0.011) (Table 1).

Table 1: Demographic Characteristics and Betel Quid-Related Oral Mucosal Disorders of the Participants

		Oral potentially malignant disorders (case group)		Non-oral potentially malignant disorders (Control group)		*p*-Value
		n	%	n	%	
Age[a)]	>63 years	17	63.0	9	39.1	0.155
	≤63 years	10	37.0	14	60.9	
Sex	Woman	27	100.0	23	100.0	
Major Constituents of Chewing[b)]	Areca nut and tobacco	20	74.1	16	65.2	1.000
	Areca nut only	6	22.2	8	34.8	
	Tobacco only	1	2.0	0	0	
Oral Mucosal Disorders[b)]	Oral Submucous Fibrosis	24	37.5	0	0.0	0.011*
	Oral Leukoplakia	13	20.3	0	0.0	
	Betel Chewer's Mucosa	27	42.2	14	60.9	
	Normal	0	0.0	9	39.1	

[a)] Fisher exact test
[b)] Two-sample Kolmogorov-Smirnov test
*$p< 0.05$= significant

Habitual betel quid chewing patterns

The present study revealed the oral potentially malignant disorders were significantly associated with duration of chewing (years) (OR= 4.571; $p= 0.022$), frequency of chewing quids per-day (quids/day) (OR= 4.121; $p= 0.024$), lifetime exposure to chewing (OR= 4.571; $p= 0.022$). Meanwhile, chewing period (minutes/quid) associated with the risk of oral potentially malignant disorders (OR= 2.475; $p= 0.225$). Habitual betel quid chewing patterns of the two groups presented in Table 2.

Table 2: Habitual Betel Quid Chewing Patterns of the Participants

		Oral potentially malignant and malignant disorders (case group)		Non-oral potentially malignant and malignant disorders (Control group)		p value	OR	95%CI	
		n	%	n	%			Min	Max
Dura-tion of chewing	> 25 years	18	66.7	7	30.4	0.022*	4.571	1.383	15.109
	≤ 25 years	9	33.3	16	69.6				
Number of quids consum-ed per-day	> 6 quids/ day	16	59.3	6	26.1	0.024*	4.121	1.233	13.771
	≤ 6 quids/ day	11	40.7	17	73.9				
Dura-tion of reten-tion in the mouth	> 40 min/ quid	11	40.7	5	21.7	0.225	2.475	0.707	8.668
	≤ 40 min/ quid	16	59.3	18	78.3				
Life-time expo-sure	>1.4 x 104 jam	18	66.7	7	30.4	0,022*	4.571	1,383	15.109
	≤1.4 x 104 jam	9	33.3	16	69.6				
Total		27	100,0	23	100,0				

Fisher exact test
*p< 0.05 = bermakna

Discussion

In our study population, the mean age of the habitual betel quid chewers were above 60 years and all of the participants in both groups were woman. In Asian Betel quid Consortium study, Lee et.al compared the habitual betel quid chewing among six countries in South and East Asia and noted that in Indonesia, the habit of betel quid chewing is more prevalent in women over the 40 years of age [6]. Indonesian men preferred practically tobacco smoking than smokeless tobacco. In contrast, the improving economy and easy access to betel quid products, along with some recently begun betel quid advertising campaigns in another Asian countries, could be the factors for widespread use of this substance, particularly among young people.6 As this study population was derived from the same age and gender, it can be claimed to be representative of all habitual betel quid chewers in this study location [15].

In the present study, both groups commonly used betel nut and tobacco that wrapped in betel leaf, placed in the mouth and actively chewed for several periods. The participants were chewing category III quid [4]. World Health Organization (WHO) noted that a common component of all betel-quid preparations is the areca nut [1]. IARC has shown that there is sufficient evidence in humans for the carcinogenicity of betel quid with tobacco [3]. Betel quid with tobacco causes oral cancer and cancer of the pharynx and oesophagus [3,16]. Several studies revealed that habitual chewers showed oral cancer and oral potentially malignant disorders, such as oral submucous fibrosis and leukoplakia [6-9,17-20].

Majority of both groups in this study had oral mucosal lesions related to habitual betel quid chewing. The finding was consistent with previous studies in North Sumatra Indonesia [7,20]. Hasibuan et al. showed 64.3% habitual betel quid chewers had oral mucosal lesions in Regency of Karo, province of North Sumatra Indonesia. Oral mucosal changes possibly occurred due to exposure to carcinogenic compounds following the use of areca nut and other betel-quid ingredients, together with continuous local irritation and trauma caused by betel quid chewing. The carcinogenic process can lead to hyperplastic/dysplastic lesions in the oral cavity and could drive some of these preneoplastic lesions to malignancy [3,21-23].

Looking at the number of quids consumed per-day (quids/day), duration of chewing (years), and lifetime exposure to chewing, the chi-square tests showed that oral potentially malignant and malignant disorders group stratified chi-square tests were all significant, except for duration of retention of the quid in the mouth (minutes/quid). Nevertheless, chewing period increased risk of 2.64 times for the occurrence of oral potentially malignant and malignant disorders. The lifetime exposure showed the most significancy for oral potentially malignant and malignant disorders (p= 0.001). This finding consistent with several [9,24,25]. IARC observed that there were statistically significant dose–response relationship for duration of chewing betel quid (in years) and for number of betel quids consumed per day (in quids/ day) on all oral cancer sites [3].

In our study, oral potentially malignant disorders diagnosed clinically due to the lack of facilities. Nevertheless, conventional oral examination is the standard method of revealing the oral potentially malignant and malignant disorders. The clinical suspicion should be confirmed by histopathological examination [13,14].

A workshop coordinated by the WHO Collaborating Centre for Oral Cancer and Precancer (Cit. Warnakulasuriya, 2007), revealed that oral submucous fibrosis and leukoplakia had been classified to oral potentially malignant disorders [13,14]. Several studies had evaluated malignant transformation this lesion and condition [26-30]. The present study was the first study to habitual betel quid chewers in Samosir island, province of North Sumatra Indonesia. Finding of the cases of oral potentially malignant and malignant disorders during screening examinations indicates the lack of awareness of symptoms of these oral mucosal disorders and lack of interest in reporting to healthcare facilities, although in general

has a local government clinic. It is recommended to improve the capacity of individual health practitioners and small medical centers to participate in oral health promotion and screening.

Conclusion

The present study showed that chewing tobacco the risk factor for oral potentially malignant and malignant disorders. Frequency of quids per-day (quids/day), chewing period (minutes/quid), duration of chewing (years), and lifetime exposure to chewing, increased the risk of oral potentially malignant and malignant disorders. The lifetime exposure showed the most significancy for oral potentially malignant and malignant disorders.

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