

## RESEARCH ARTICLE

# Oral Cancer Awareness and its Determinants among a Selected Malaysian Population

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### Abstract

**Objective:** To assess oral cancer awareness, its associated factors and related sources of information among a selected group of Malaysians. **Methods:** A cross-sectional survey was conducted on all Malaysian ethnic groups aged  $\geq 15$  years old at eight strategically chosen shopping malls within a two week time period. Data were analysed using chi-square tests and multiple logistic regression. Significance level was set at  $\alpha < 0.05$ . **Results:** Most (84.2%) respondents had heard of oral cancer. Smoking was the most (92.4%) recognized high risk habit. Similar levels of awareness were seen for unhealed ulcers (57.3%) and red/white patches (58.0%) as signs of oral cancer. Age, gender, ethnicity, marital status, education, occupation and income were significantly associated with oral cancer awareness ( $p < 0.05$ ). **Conclusions:** There was a general lack of awareness regarding the risk habits, early signs and symptoms, and the benefits of detecting this disease at an early stage. Mass media and health campaigns were the main sources of information about oral cancer. In our Malaysian population, gender and age were significantly associated with the awareness of early signs and symptoms and prevention of oral cancer, respectively.

**Keywords:** Mouth neoplasms - awareness - risk habits - signs and symptoms - mouth self-examination

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### Introduction

The burden of cancer is increasing in economically developing countries as a result of growth and aging populations. The adoption of a lifestyle with high risk habits due to rapid economic development further compounds the impact of cancer (Jemal et al., 2011). Worldwide, oral cancer is ranked as the eleventh most common type of cancer, with 130,000 reported deaths annually (Warnakulasuriya, 2009). It is most commonly seen in South and South East Asian countries such as India, Bangladesh, Taiwan and Sri Lanka (World Health Organization, 1984). Oral cancer is largely preventable by avoiding known risk factors and international guidelines have stressed the importance of early detection (Johnson and Bain, 2000; Johnson 2003).

In Malaysia, malignant neoplasms account for 10.6% of deaths at government hospitals (Omar et al., 2006). A nationwide survey carried out to obtain baseline data showed ethnic variation in the incidence of oral cancer and potentially malignant lesions, whereby the Indians were found to be at the highest risk, followed by the Indigenous people of East Malaysia (Zain et al., 1997). Efforts to

systematically report cancer incidences only began in 2003 by the National Cancer Registry (NCR) and a higher incidence of oral cancer was confirmed among the Indians. In 2006, the National Cancer Registry (NCR) of Malaysia reported that tongue cancer was ranked as the sixth most common malignancy among Indian males, while mouth cancer was ranked as the fourth most common among Indian females (Omar et al., 2006).

The role of smoking, alcohol consumption and betel quid chewing as a risk factor for oral cancer has been established by numerous researchers (Balaram et al., 2002; De Stefani et al., 2007; Yen et al., 2008; Lin et al., 2011). Besides these habitual factors, other stimuli such as human papilloma virus (HPV) infection (Lohavanichbut et al., 2009), genetic susceptibility (Drummond et al., 2005) and diet (De Stefani et al., 2005) has been shown to influence carcinogenesis too.

Public awareness of oral cancer is low (Horowitz et al., 1995; Lowry and Craven 1999; Pakfetrat et al., 2010; Peker and Alkurt 2010) and studies have shown that oral cancer awareness is lesser when compared with other types of cancers (Warnakulasuriya et al., 1999; Lawoyin et al., 2003; Prayman et al., 2009; Rogers et

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al., 2011a). Furthermore, it has been observed that the majority of certain populations studied failed to recognize the early signs and symptoms of oral cancer such as white or red patches and persistent ulcers (West et al., 2006; Amarasinghe et al., 2010; Devadiga and Prasad 2010). A recent study on delayed presentation of oral cancers found that the patients thought their symptoms were trivial and would resolve on its own (Rogers et al., 2011b). They were also of the opinion that the best way to ensure early presentation was through improved awareness of the disease as it is currently grossly lacking. Oral cancer awareness among Malaysians is not well documented; however a preliminary analysis which reported that approximately 67.1% of oral cancer cases were diagnosed at advanced stages (Doss et al., 2011) is indeed alarming. As early detection greatly improves the chances of survival and increases patients' quality of life, the ability to identify risk factors and early signs and symptoms would appear to be crucial for every person. Considering the high prevalence of oral cancer among Indians and the presentation of cancer at advanced stages in Malaysia, data with regards to the level and extent of oral cancer awareness in Malaysia is sorely lacking and as such, urgently needed. Therefore, this study was aimed at obtaining initial baseline information on the level of oral cancer awareness among a selected population of Malaysians, and also to determine the associated socio-demographic factors in terms of high risk habits, signs and symptoms and early detection and prevention of oral cancer. In addition, sources of information about oral cancer were also assessed. It is hoped that the findings from this initial study will help to direct future research on a larger and more widespread sample for greater generalisability in order to strengthen existing health education efforts for the Malaysian public regarding the preventable nature of oral cancer, with the aim of reducing the practice of associated high risk habits and eventually its prevalence.

## Materials and Methods

This was a cross-sectional observational survey carried out in Selangor, the most populous state of Malaysia. Using PS Sample Size Software with a level of significance set at 0.05, an anticipated prevalence of awareness regarding associated signs and symptoms of oral cancer at 66.5% (West et al., 2006), an estimated precision of 0.05 and at a 30% non-response rate, the final sample size for this study was estimated at 458. Eight main shopping malls located at various parts of the Klang Valley (within the state of Selangor) were strategically chosen to capture the population from all economic and social backgrounds. A non-probability sampling technique (convenience sampling) was employed. All Malaysian public aged 15 years old and above who were at the chosen shopping malls within a two week time period were eligible for inclusion in the study. Permission was obtained from the shopping malls' management before the study was carried out.

A structured questionnaire was developed and its contents face-validated by three dental public health

specialists whereby necessary modifications were made based on their comments. The questionnaire was prepared in both Bahasa Malaysia (the national language) and English and it was pre-tested prior to its use in the field. Factor analysis revealed that 16 items were loaded into four factors. All domains gave a fairly good internal consistency reliability (Cronbach alpha 0.60-0.87), indicating that each domain was indeed reliable as a group on its own. The final questionnaire consisted of five sections: i) socio-demographic information (7 questions) namely data on age, gender, ethnicity, education level, marital status and income; ii) oral cancer awareness (6 questions) including identification of risk habits, signs and symptoms and its preventive nature; iii) source of information (2 questions); iv) the impact of oral cancer awareness on preventive behavior (5 items); and (v) the impact of oral cancer awareness on practice of risk habits (3 questions). Oral cancer awareness was defined as "having knowledge of or have heard of cancer of the oral cavity". Data collection was then carried out upon obtaining written consent from the respondents. The questionnaire was self-administered; however, the interviewer was readily available when respondents required assistance.

For the purpose of this study, only the data on oral cancer awareness, source of information and socio demographic factors associated with awareness were analyzed using the Statistical Package for Social Science (SPSS) version 12.0. Frequencies and percentages were calculated to describe prevalence of awareness on oral cancer, associated risk habits, sign and symptoms and its preventive nature. Chi-square tests were then performed to associate the socio demographic factors with the prevalence of oral cancer awareness. Finally, multiple logistic regression using forward and backward method was employed in order to determine factors associated with awareness of risk habits, sign and symptoms, and prevention of oral cancer. The significance level in this study was set at 0.05. Prior ethical approval was obtained from the Medical Ethics Committee (MEC), University of Malaya [MEC no: DF OP1109/0084(L)] before commencing this study.

## Results

A total of 438 respondents participated in this study with a response rate of 95%. The socio-demographic characteristics of the study population are shown in Table 1. The sample comprised an almost equal distribution of male and female respondents (44.5% vs 55.5%). Most of the respondents were Malays (83.1%), followed by Chinese (9.4%), Indians (5.7%) and other ethnic groups (1.8%). More than three quarters of them were aged between 20-39 years old (76.6%) and had tertiary level education (79.9%). Most of them worked in the private sector and slightly more than half of them were single (58.2%).

General awareness of oral cancer was high at 84.2% (Table 1). There was a significant difference in the awareness of oral cancer in terms of ethnicity ( $P=0.000$ ) and occupation ( $P=0.0048$ ). The Malays were found to

be the most aware, followed by the Indians. In terms of occupation, government servants had the highest level of oral cancer awareness (P=0.048).

Awareness of oral cancer in this population was analysed according to three broad categories namely high risk habits, signs and symptoms and prevention as

shown in Table 2. More than 90% of the respondents were able to recognize smoking as a risk habit for oral cancer, while only half of them recognized excessive alcohol consumption as a risk factor. Relatively, among all ethnic groups, a larger proportion (83.3%) of Indians was aware of betel quid chewing as a risk factor while those aged 19

**Table 1. Awareness of Oral Cancer by Socio-demographic Characteristics**

Characteristics	Total n (%)	Aware n (%)	Not aware n (%)	P-value
Total	438 (100.0)	369 (84.2)	69 (15.8)	
Gender				
Male	195 (44.5)	159 (81.5)	36 (18.5)	0.163
Female	243 (55.5)	210 (86.4)	33 (13.6)	
Ethnic group				
Malay	364 (83.1)	319 (87.6)	45 (12.4)	0.000 <sup>a</sup>
Chinese	41 (9.4)	27 (65.9)	14 (34.1)	
Indian	25 (5.7)	18 (72.0)	7 (28.0)	
Others	8 (1.8)	5 (62.5)	3 (37.5)	
Age				
≤19	22 (5.0)	15 (68.2)	7 (31.8)	0.473 <sup>a</sup>
20-39	334 (76.6)	286 (85.6)	48 (14.4)	
40-59	69 (15.8)	56 (81.2)	13 (18.8)	
≥60	11 (2.5)	10 (90.9)	1 (9.1)	
Education				
Tertiary	350 (79.9)	295 (84.3)	55 (15.7)	0.964
Secondary and below	88 (20.1)	74 (84.1)	14 (15.9)	
Occupation				
Government	128 (29.2)	117 (91.4)	11 (8.6)	0.048
Private	175 (40.0)	140 (80.0)	35 (20.0)	
Unemployed	30 (6.9)	26 (86.7)	4 (13.3)	
Students	105 (24.0)	86 (81.9)	19 (18.1)	
Marital status				
Single	255 (58.2)	214 (83.9)	41 (16.1)	0.826
Married	183 (41.8)	155 (84.7)	28 (15.3)	
Income				
≤RM3,000	198 (45.2)	168 (84.8)	30 (15.2)	0.807
≥RM3,000	105 (24.0)	89 (84.8)	16 (15.2)	
Unemployed	130 (29.7)	107 (82.3)	23 (17.7)	

<sup>a</sup>Simple logistic regression was used as assumption of chi-square test was not fulfilled

**Table 3. Factors Associated with Awareness of High Risk Habits of Oral Cancer by Multiple Logistic Regression**

Variables	n (%)	Crude OR	Adj. OR	95% CI	P-value
Betel quid chewing					
Marital status					
Single	214 (58.0)	1	1		
Married	155 (42.0)	3.85	2.59	1.56-4.29	<0.001
Income					
<3000	168 (46.2)	1	1		
>3000	89 (24.5)	3.27	2.43	1.31-4.52	0.005
Unemployed	107 (29.4)	0.51	0.68	0.41-1.16	0.157
Smoking					
Occupation					
Government	117 (31.7)	1	1		
Private	140 (37.9)	1.82	2.07	0.82-5.29	0.125
Unemployed	26 (7.0)	1.5	19.36	0.84-447.25	0.064
Students	86 (23.3)	2.56	45.77	2.27-922.64	0.013
Income					
< 3000	168 (46.2)	1	1		
> 3000	89 (24.5)	1.06	0.87	0.33-2.30	0.783
Unemployed	107 (29.4)	1.3	0.06	0.03-0.90	0.042
Alcohol drinking					
Occupation					
Government	117 (31.7)	1	1		
Private	140 (37.9)	0.52	0.6	0.32-0.85	0.058
Unemployed	26 (7.0)	0.2	0.21	0.08-0.54	0.002
Students	86 (23.3)	1.19	1.19	0.67-2.12	0.564
Ethnicity					
Malay	319 (86.4)	1	1		
Chinese	27 (7.3)	0.14	0.17	0.05-0.41	0.002
Indian	18 (4.9)	0.51	0.59	0.19-1.35	0.292
Others	5 (1.4)	3.21	4.22	0.36-29.03	0.204

**Table 2. Awareness of Oral Cancer Risk Habits, Signs and Symptoms and Prevention (n=369)**

Socio-demographic characteristics	High Risk Habits			Signs & Symptoms		Prevention	
	Betel quid chewing	Smoking	Alcohol consumption	Red/white spot	Unhealed ulcer	Treatment effectiveness at early stage	MSE
	n (% aware)	n (% aware)	n (% aware)	n (% aware)	n (% aware)	n (% aware)	n (% aware)
Total	201 (54.5)	341 (92.4)	192 (52.0)	213 (58.0)	211 (57.3)	284 (77.0)	225 (61.0)
Gender							
Male	88 (55.3)	146 (91.8)	76 (47.8)	78 (49.1)	80 (50.3)	119 (74.8)	93 (58.5)
Female	113 (53.8)	195 (92.9)	116 (55.2)	135 (64.3)	131 (62.4)	165 (78.6)	132 (62.9)
Ethnic							
Malay	163 (51.1)	296 (92.8)	177 (55.5)	183 (57.7)	179 (56.3)	244 (76.5)	198 (62.1)
Chinese	20 (74.1)	24 (88.9)	4 (14.8)	17 (63.0)	15 (55.6)	20 (74.1)	14 (51.9)
Indian	15 (83.3)	16 (88.9)	7 (38.9)	10 (55.6)	15 (83.3)	15 (83.3)	10 (55.6)
Others	3 (60.0)	5 (100.0)	4 (80.0)	3 (60.0)	2 (40.0)	5 (100.0)	3 (60.0)
Age							
≤19	2 (13.3)	15 (100.0)	8 (53.3)	13 (86.7)	10 (66.7)	8 (53.3)	6 (40.0)
20-39	144 (50.3)	266 (93.0)	154 (53.8)	161 (56.3)	164 (57.3)	217 (75.9)	170 (59.4)
40-59	44 (78.6)	50 (89.3)	28 (50.0)	35 (62.5)	33 (58.9)	50 (89.3)	42 (75.0)
≥60	9 (90.0)	8 (80.0)	1 (10.0)	3 (30.0)	3 (30.0)	7 (70.0)	5 (50.0)
Education							
Tertiary	161 (54.6)	27 (93.2)	160 (54.2)	160 (54.6)	170 (57.8)	229 (77.6)	181 (61.4)
Secondary and below	40 (54.1)	66 (89.2)	32 (43.2)	53 (71.6)	41 (55.4)	55 (74.3)	44 (59.5)
Occupation							
Government	71 (60.7)	104 (88.9)	70 (59.8)	70 (59.8)	67 (57.3)	88 (75.2)	71 (60.7)
Private	87 (62.1)	131 (93.6)	61 (43.6)	87 (62.1)	84 (60.0)	116 (82.9)	87 (62.1)
Unemployed	17 (65.4)	24 (92.3)	6 (23.1)	12 (50.0)	9 (36.0)	20 (76.9)	16 (61.5)
Students	26 (30.2)	82 (95.3)	55 (64.0)	44 (51.2)	51 (59.3)	60 (69.8)	51 (59.3)
Marital status							
Single	88 (41.1)	199 (93.0)	121 (56.5)	124 (58.2)	133 (62.1)	165 (77.1)	134 (62.6)
Married	113 (72.9)	142 (91.6)	71 (45.8)	89 (57.8)	78 (50.6)	119 (76.8)	91 (58.7)
Income							
≤RM3,000	89 (53.0)	154 (91.7)	94 (56.0)	109 (64.9)	98 (58.3)	132 (78.6)	105 (62.5)
≥RM3,000	70 (78.7)	82 (92.1)	35 (39.3)	47 (52.8)	52 (58.4)	74 (83.1)	52 (58.4)
Unemployed/ students	39 (36.4)	100 (93.5)	61 (57.0)	55 (51.9)	60 (56.1)	74 (69.2)	65 (60.7)

**Table 4. Factors Associated with Awareness of Oral Cancer Signs and Symptoms by Multiple Logistic Regression**

Variables	n (%)	Crude OR	Adj. OR	95%CI	P-value
<b>Red/white spot</b>					
<b>Gender</b>					
Male	159 (43.1)	1	1		
Female	210 (56.9)	1.92	2.33	1.47-3.69	<0.001
<b>Age</b>					
≤19	15 (4.1)	1	1		
20-39	286 (77.5)	0.2	0.19	0.04-0.92	0.039
40-59	56 (15.2)	0.26	0.26	0.05-1.41	0.117
≥60	10 (2.7)	0.07	0.07	0.01-0.59	0.014
<b>Education level</b>					
Tertiary	295 (79.9)	1	1		
Below tertiary	74 (20.1)	2.09	1.96	1.04-3.67	0.036
<b>Income</b>					
<3000	168 (46.2)	1	1		
>3000	89 (24.5)	0.61	0.64	0.35-1.17	0.148
Unemployed	107 (29.4)	0.58	0.46	0.27-0.79	0.005
<b>Unhealed ulcer</b>					
<b>Gender</b>					
Male	159 (43.1)	1	1		
Female	210 (56.9)	1.01	1.62	1.06-2.48	0.027
<b>Marital status</b>					
Single	214 (58.0)	1	1		
Married	155 (42.0)	0.62	0.63	0.40-0.96	0.033
<b>Ethnicity</b>					
Malay	319 (86.4)	1	1		
Chinese	27 (7.3)	0.97	1.03	0.46-2.31	0.934
Indian	18 (4.9)	3.88	4.46	1.25-15.93	0.021
Others	5 (1.4)	0.52	0.55	0.09-3.43	0.526

**Table 5. Factors Associated with Awareness of Prevention of Oral Cancer by Multiple Logistic Regression**

Variables	n (%)	Crude OR	Adj. OR	95%CI	P-value
<b>Early treatment</b>					
<b>Age</b>					
≤19	15 (4.1)	1	1		
20-39	286 (77.5)	2.75	2.75	0.96-7.86	0.059
40-59	56 (15.2)	7.29	7.29	1.95-27.33	0.003
≥60	10 (2.7)	2.04	2.04	0.38-11.07	0.408
<b>Mouth Self Examination (MSE)</b>					
<b>Age</b>					
≤19	15 (4.1)	1	1		
20-39	286 (77.5)	2.2	2.62	0.89-7.65	0.079
40-59	56 (15.2)	4.5	7.18	1.99-25.77	0.003
≥60	10 (2.7)	1.5	2.51	0.47-13.55	0.284
<b>Marital status</b>					
Single	214 (58.0)	1	1		
Married	155 (42.0)	0.85	0.6	0.37-0.97	0.038

years and below were the least aware (13.3%). In contrast, the biggest proportion of awareness about red or white patches in the mouth as early signs of oral cancer were found among those aged 19 years and below (86.7%). The elderly (30.0%) on the other hand, demonstrated the least awareness. Awareness about unhealed ulcers being an early sign of oral cancer was generally low across all categories at about 50%. Most (83.1%) of respondents

earning an income of more than RM3000 were aware that oral cancer is treatable at an early stage, and a large proportion of those aged 40-59 years old was aware (75.0%) about mouth self-examination (MSE).

Respondents mostly obtained their information regarding oral cancer from three main sources including mass media (35.3%); health campaigns (21.4%) and doctors/dentists and other health staff (15.3%). Other notable sources of information were from the internet (13.2%) and family member/relatives (12.9%)

Table 3 shows the socio-demographic factors associated with the awareness of oral cancer in terms of high risk habits. Marital status and income were significantly associated with awareness of betel quid chewing whereby respondents living, or who used to live with a spouse (aOR 2.59, 95%CI 1.56-4.29) and those earning more than RM3000 (aOR 2.43, 95%CI 1.31-4.52) were two times more likely to report a higher level of awareness. Chinese respondents (aOR 0.17, 95%CI 0.05-0.41) and those who were unemployed (aOR 0.21, 95%CI 0.08-0.54) were less likely to demonstrate awareness about alcohol consumption as a risk factor for oral cancer.

The factors associated with respondents' awareness of red or white spots as an early sign of oral cancer were their gender, age, education level and income (Table 4). Women (aOR 2.33, 95% CI 1.47-3.69) and those educated below tertiary level (aOR 1.96, 95%CI 1.04-3.67) were twice more likely to be aware, while respondents aged 60 years old and above (aOR 0.07, 95%CI 0.01-0.59) and those who were unemployed including students (aOR 0.46, 95%CI 0.27-0.79) were less likely to be aware. Indians were four times more likely to be aware that an unhealed ulcer was an early sign of oral cancer whereas respondents who were married were less likely to be aware (aOR 0.63, 95%CI 0.40-0.96).

Table 5 shows factors associated with the awareness of oral cancer prevention. Those aged between 40-59 years old were seven times more likely to be aware about MSE (aOR 7.29, 95%CI 1.95-27.3) and the treatable nature of oral cancers that are detected early (aOR 7.18, 95%CI 1.99-25.77). In contrast, those who were married were less likely to be aware of MSE (aOR 0.60, 95%CI 0.37-0.97).

## Discussion

The findings of this study showed that a large proportion of the selected Malaysian population was aware about oral cancer to varying extents. Although awareness of smoking as a risk factor was very high, a considerable proportion was not aware about other habits that could increase the risk of cancer such as alcohol consumption and betel quid chewing. Only about half of the population was found to be able to recognize unhealed ulcers and red or white lesions in the mouth as early signs for oral cancer. Mass media and health campaigns were the main sources of information regarding this disease. Socio-demographic characteristics such as occupation, marital status, income, ethnicity, gender, age and education level were found to be significant factors associated with oral cancer awareness in this study sample.

All observational studies such as cross-sectional surveys are prone to limitations and bias (Lu, 2009). The main limitation of this study was that the sampling points were limited to shopping complexes. This method might have introduced selection bias of the respondents of a certain generation or demographic characteristics. To minimise this bias, the malls were strategically selected based on its varied location within the Klang Valley in order to ensure that the population of different demographic profiles who frequent these outlets were captured. Considering that this could be one way of capturing different population demographics within a limited sampling time frame, this sampling method was deemed to be appropriate. Moreover, the sample captured was representative of the Malaysian population where it consisted of an ethnic profile that is in accordance with the country's population profile (with the majority of the population being Malays followed by Chinese and Indians). Another limitation of this study relates to the comprehensibility of certain phrases that were used in the questionnaire, for example 'oral cancer'. To improve this and to avoid confusion among the respondents, the term 'mouth cancer' was used instead of 'oral cancer' and the questionnaire was pre-tested before being used on the public.

Most of the respondents in this study were young adults and of high education level. More than 80% of them had heard of oral cancer, which is comparable with earlier studies (Ariyawardana and Vithanaarachchi 2005; West et al., 2006; Elango et al., 2009; Amarasinghe et al., 2010). A significant ethnic difference in terms of oral cancer awareness was observed in this study. This finding concurred with that reported by Amarasinghe and colleagues (2010) in Sri Lanka. In the present study, the Malays were found to be the most aware of oral cancer followed by the Indians. However this difference could be attributed to the very high proportion of Malay respondents (>80%) recruited in this study. Awareness was also found to be high among those unemployed. Considering that one of the main sources of information was from mass-media, thus it is not unusual that these respondents could have been more exposed to the mass media in terms of time spent watching television or listening to the radio compared to working people, and as such, could have obtained information from such sources. These findings corroborates earlier findings which report that mass media is a common source of information regarding oral cancer (Ariyawardana and Vithanaarachchi 2005; Petty and Scully 2007; Amarasinghe et al., 2010; Srikanth et al., 2011). In addition, housewives and retirees also spent more time socialising with either friends, neighbours or community groups from whom they could have heard about oral cancer.

Among the high risk habits, smoking was the most recognizable risk habit, whereas awareness regarding the association of excessive alcohol consumption with oral cancer was much lower. This concurs with other studies done worldwide (Canto et al., 1998; Warnakulasuriya et al., 1999; Cruz et al., 2002; West et al., 2006; Prayman et al., 2009). Students were significantly most aware about the adverse effects of smoking than working adults.

This could be attributed to their exposure to various smoking cessation campaigns that are being carried out by the Ministry of Health Malaysia throughout schools nationwide. In this study, Indians were found to be the most aware that betel quid chewing is a high risk habit, which is similar to findings from other studies that have been carried out on different betel quid chewing populations such as India and Sri Lanka, whereby betel quid chewing was reported as a more recognized risk habit than smoking (Tan et al., 2001; Ariyawardana and Vithanaarachchi 2005; Elango et al., 2009; Amarasinghe et al., 2010). The Indians in this present study also seem to be most aware that unhealed ulcers were an early sign of oral cancer. This could be attributed to the fact that in Malaysia, the prevalence of oral cancer is the highest among the Indians; thus making it possible that most of them would have heard about this disease, its risk factors and sign and symptoms from their friends, relatives or health professionals. Awareness about the harmful effects of quid chewing was also significantly more evident among those with a higher income, which could be attributed to their higher education level. This finding is supported by previous studies which have documented that awareness is proportional to the education level of respondents (Ariyawardana and Vithanaarachchi 2005; Elango et al., 2009).

However, an important finding of this study is that respondents aged 19 years old and below were found to lack awareness about betel quid chewing as a risk habit of oral cancer. Although this could be expected as betel quid chewing among Malaysians is most commonly practiced among those above the age of 50 (Ghani et al., 2011) and in rural areas, nevertheless, the lack of exposure to this pertinent fact about oral cancer needs to be further addressed especially in campaigns that are being directed to this target group. Considering that most of these teenagers would have been exposed to the school dental service during their schooling days, it is alarming to know that they still lack knowledge about this important fact; indicating that oral health education messages delivered in schools need to include such important aspects of oral cancer and its related risk habits. Significant ethnic differences were observed in identifying excessive alcohol consumption as a risk habit for oral cancer; with the Chinese being the least aware. In Malaysia, the habit of drinking is more common and is considered a social norm among the Chinese and Indians as compared to Malays. This could be a reason for them being oblivious to the risk of drinking, a finding which has also been reported by other researchers (Hay et al., 2002; Prayman et al., 2009). This lack of awareness among the Chinese could also be due to the fact that those practicing the habit might be less willing to accept that their behavior carries a health risk.

Gender differences were observed in terms of the awareness of the signs and symptoms of oral cancer. Women were found to be significantly more aware than men. This finding concurs with other studies that reported an association between gender and awareness (Prayman et al., 2009; Srikanth Reddy et al., 2011). A possible explanation for this include the fact that women are generally more concerned about their health and general

well-being, and therefore might be more aware and concerned about any physical changes occurring to their body. Those aged 60 years and above were found to be the least aware that red and/or white patches were early signs of oral cancer. This could be explained by the fact that the elderly perceived the changes in their oral mucosa as part of the natural biological process of ageing. In contrast, the Indians were four times more likely to be able to identify unhealed ulcers as an early sign. This could be due to prior exposure to such knowledge from friends and relatives who may have suffered from this condition before.

The selected Malaysian population in this study recorded a lower level of belief that oral cancer can be treated more effectively if it is presented at an early stage as compared to other studies (Warnakulasuriya et al., 1999; Ariyawardana and Vithanaarachchi 2005; Prayman et al., 2009). This may very well reflect the low levels of self-efficacy and cognitive dissonance among the Malaysian population which account for the high rate of late presentation of this disease among oral cancer sufferers (Bandura 1977; Schwarzer and Luszczynska 2005). Although many had heard about oral cancer, however they may not have possibly obtained in-depth information about this disease as it is not commonly advertised/promoted in health campaigns in Malaysia as compared to other types of cancers. In this study, the fact that those aged between 40-59 were found to be seven times more aware about the treatable nature of this disease when detected early and about mouth self examination, could most likely reflect that they were more frequent health utilizers who visited hospitals for various health reasons, and therefore could have obtained such information from posters or pamphlets on oral cancer.

Overall, a lack of in-depth awareness of oral cancer with regards to high risk habits, signs and symptoms and early detection and prevention of this disease was observed in this population. As their general awareness about oral cancer is good, a redirection of focus is warranted towards implementing intensive oral health education programs for the recognition of risk habits, warning signs and early detection of oral cancer by mouth self-examination. Such oral health education programs could be carried out as a whole population strategy utilizing the mass media or as a directed risk approach aimed at different target groups, in particular, the school-going teenagers (as part of the on-going school dental service), college and tertiary students as well as young working adults to increase their awareness and to address gaps in knowledge as identified in this study.

In conclusion, this study has highlighted that although the majority of Malaysians who frequented public shopping malls had heard about oral cancer, there was still a general lack of awareness regarding the risk habits, early signs and symptoms and the benefits of detecting this disease at an early stage. The main sources of information regarding oral cancer were mass-media and health campaigns. Gender and age were significant factors associated with the awareness of early signs and symptoms and the prevention of oral cancer respectively.

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