

DENTAL PATIENT KNOWLEDGE ABOUT THE EFFECTS OF SMOKING AND ATTITUDES ABOUT THE ROLE OF DENTISTS IN SMOKING CESSATION

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Abstract. Dentists can offer their patients who smoke tobacco assistance with smoking cessation. We conducted this study to assess dental patient knowledge about the effects of smoking and perceptions and attitudes regarding the role of dentists in smoking cessation counselling. We conducted this study to inform tobacco cessation programs that could potentially include dentists. We conducted a cross-sectional study using a self-administered questionnaire among 375 patients. The mean age of subjects was 33.4 years; females comprised 51.5%. Participants were divided into 3 groups: those who never smoked ($n = 263$, 70.7%), smokers ($n = 92$, 24.7%), and ex-smokers ($n = 17$, 4.5%). Significantly more participants ($p = 0.046$) who never smoked (92.9%) knew smoking can cause bad breath than smokers (86.9%). Significantly more participants ($p = 0.002$) who never smoked (74.8%) knew smoking can cause periodontal disease than smokers (57.6%). Significantly more participants ($p < 0.001$) who never smoked (84.5%) knew smoking can cause oral cancer than smokers (66.7%). Significantly more participants ($p < 0.001$) who never smoked (86.7%) knew smoking can cause lung cancer than smokers (69.7%). Significantly more participants who never smoked (85.5%) felt dentists should be interested in the smoking status of their patients ($p = 0.004$) than smokers (72.6%). Significantly more participants ($p = 0.08$) who never smoked (69.6%) stated dentists should give smoking cessation advice than smokers/ex-smokers (59.0%). Smoker/ex-smokers had less knowledge about the effects of smoking on oral and general health than non-smokers. Both smokers/ex-smokers and non-smokers felt dentists should provide smoking cessation advice.

Keywords: smoking cessation, dental clinics, dental patients, dentists

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INTRODUCTION

The World Health Organization (WHO) has estimated smoking and smokeless tobacco use are responsible for the death of about six million people world-wide each year (WHO, 2015). Tobacco use seriously affects general and

oral health, and can cause oral precancers and cancers (Warnakulasuriya *et al*, 2005). Smoking increases the risk of periodontal disease, reduces benefits of treatment, and increases the likelihood of losing teeth (Labriola *et al*, 2005; Krall *et al*, 2006; Chambrone *et al*, 2010). Smoking also has a significant affect on periodontal health, can delay wound healing after tooth extraction and surgery, causes halitosis, and can cause discoloration of teeth and restorative materials (Johnson *et al*, 2000; Warnakulasuriya, 2009; Yahya and Amer Siddiq, 2011; Yahya *et al*, 2012). Jha *et al* (2013) reported smoking cessation before age 40 years reduces the risk for death associated with continued smoking by about 90%. The adverse effects of tobacco on oral tissues are usually reversible (Warnakulasuriya *et al*, 2010), giving another reason to stop smoking.

Studies have proven the effectiveness of smoking cessation programs conducted by dentists (Omaña-Cepeda *et al*, 2016). A Cochrane review found that tobacco cessation interventions conducted by oral health professionals found they increased smoking cessation rates compared to no intervention (Carr and Ebbert, 2012). Current smokers are more likely to have perceived dental problems than those who never smoked (Dye *et al*, 2006). Dentists who provide smoking cessation advice do not alienate smokers receiving dental treatment (Rikard-Bell *et al*, 2003). Patients stated dentists should offer smoking cessation services; those patients also felt comfortable receiving advice from dentists about quitting smoking (Campbell *et al*, 1999). Oral health professionals need to be on the front line in battling tobacco use.

The Tobacco Control and Framework Convention on Tobacco Control (FCTC) Unit was established in Malaysia in 2006 as part of the Ministry of Health Non-

Communicable Diseases Section, Disease Control Division. One of its objectives is to reduce tobacco use so that it will no longer be a major public health problem (Oral Health Division, 2011). Therefore, the recently published Ministry of Health National Oral Health Plan for 2011–2020 includes oral health professionals in the group of providers who should assist smokers in quitting (Oral Health Division, 2011). An *et al* (2008) found involving more than one type of clinician increases the number of times smokers attempt to quit and their readiness to do so. Including smoking cessation services into primary dental care provides a broader, better-coordinated tobacco control strategy (Croucher, 2005). The dental care setting provides an opportunity to offer smoking cessation advice and assistance, particularly if the patients' oral health problems are related to tobacco use (Gordon *et al*, 2007).

In Malaysia, several studies have found the lack of educational materials and knowledge about smoking cessation constitute barriers to dentists providing smoking cessation services (Yahya and Coucher, 2005; Asmaon and Ishak, 2007; Vaithilingam *et al*, 2012; Amer Siddiq *et al*, 2014). Dentists have acknowledged they should discuss patient smoking habits and play a role in providing smoking cessation services (Yahya and Coucher 2005; Asmaon and Ishak 2007; Vaithilingam *et al*, 2012; Amer Siddiq *et al*, 2014). Hence, it is important to know dental patient receptiveness to smoking cessation counselling provided by dentists before asking dentists to provide those services. The objectives of this study were to: 1) assess patient knowledge regarding the effects of smoking and compare this by smoking status, 2) assess patient perceptions regarding the role of dentists in smoking cessation counselling and compare them

by smoking status, and 3) assess smokers attitudes about smoking cessation counselling.

MATERIALS AND METHODS

We conducted a cross sectional study using a self-administered questionnaire among 375 dental patients aged 15-65 years attending one of two selected private and two selected public dental clinics. These clinics were selected based on the largest number of patients. The private dental clinics are in urban (Sungai Petani) and rural (Pendang) Kedah, Malaysia. The government dental clinics were in urban (Klinik Pergigian Jalan Rasah) Seremban and rural (Klinik Pergigian Linggi) Linggi, Port Dickson, Malaysia. We used convenience sampling to select patients on the day of the study. Data collection lasted for two weeks at each site. Patient inclusion criteria were: 1) a dental patient aged 15-65 years, 2) a Malaysian citizen, 3) able to read, understand and answer the questionnaire in Bahasa Malaysia, 4) who was willing to give verbal consent to participate in the study. Those who met inclusion criteria were invited to participate and asked to fill out a self-administered questionnaire. Sample size calculation was based on a 5% margin of error and a 95% level of confidence (Raosoft, 2011); 377 subjects was the minimum number deemed adequate for this study.

The questionnaire used in our study was adapted from previous studies (Rikard-Bell *et al*, 2003; Lung *et al*, 2005; Terrades *et al*, 2009; Sood *et al*, 2014). It explored three areas: 1) participant knowledge about oral health and the general health effects of smoking, 2) smoker attitudes about smoking cessation counselling and 3) participant perceptions about the role of dentists in smoking cessation

intervention. We developed the questionnaire in English and then translated it into Bahasa Malaysia using three language experts. A dentist and two college lecturers in the field of engineering and home economics who are experts in the language back translated the questionnaire from Bahasa Malaysia into English. The back-translated English version was compared with the original English version to determine the accuracy of the translation.

Three dental public health experts checked the content validity, ease of understanding, logic and order of the questions on the final back-translated English version. The questionnaire was then pilot tested among 50 dental patients not included in the main study. One patient did not clearly understand the statement, "My dentist should provide oral care, nothing more"; consequently, we rewrote the sentence to be clearer. The result of the Cronbach's alpha reliability test was 0.749.

The final modified questionnaire consisted of four sections: 1) participant demographics and tobacco use history (12 questions), 2) participant knowledge regarding the effects of smoking on general and oral health (11 questions), 3) participant perceptions regarding dentists providing smoking cessation counselling (6 questions), and 4) smoking participant attitudes about smoking cessation counselling (6 questions).

Descriptive analysis was used to analyze the data using SPSS, version 22.0 software (IBM, Armonk, NY). Chi-square analysis was used to evaluate associations between smoking status and knowledge and perceptions of the participants. A p -value < 0.05 was considered statistically significant. Binary logistic regression analysis was used to evaluate possible associations between sociodemographic factors, including the clinic location (ur-

Table 1
Sociodemographic characteristics of study subjects.

Characteristics	Mean \pm SD	No. (%)
Age (years)	33.4 \pm 13.1	
Gender ^a		
Male		170 (45.3)
Female		193 (51.5)
Ethnicity ^a		
Malay		289 (77.9)
Chinese		30 (8.1)
Indian/others		52 (13.9)
Marital status		
Single/divorced		172 (45.9)
Married		203 (54.1)
Education level ^a		
University		102 (27.2)
College		67 (18.4)
Primary/Secondary School		196 (52.3)
Number of family members who smoke	1.3 \pm 1.7	
Smoking status ^a		
Never smoked		263 (70.7)
Ex-smoker		17 (4.5)
Smoker		92 (24.7)

^aDenominators vary due to missing values.

ban or rural), and smoking status.

Ethical approval for this study was obtained from the Faculty of Dentistry, University of Malaya, Research Ethics Committee (Ethics Committee IRB reference number: DF CO1301/003[P]) and the Ministry of Health, Malaysia, Medical Research Ethics Committee (MREC; reference number: KKM/NIHSEC/ P13-551). This study was also registered with the National Medical Research Registry (NMRR), Ministry of Health, Malaysia (registration number: NMRR-13-406-15721).

RESULTS

Sociodemographic characteristics

Three hundred seventy-five participants were included in the study. Table 1

shows the sociodemographic characteristics of the participants. The participants had a mean (\pm SD) age of 33.4 (\pm 13.1) years. Fifty-one point five percent of participants were female, 77.9% were Malay, 54.1% were married and 52.3% had a primary or secondary school education. The participants had a mean (\pm SD) number of 1.3 (\pm 1.7) family members. Seventy point seven percent of participants had never smoked, 24.7% were smokers and 4.5% were ex-smokers.

Ninety-two participants in our study were smokers. The average length of time smoked was 13 years. Ninety-five percent of smoking participants were males. The mean age (\pm SD) of smokers was 33 (\pm 12) years and of non-smokers was 33 (\pm 13) years. The average number of cigarettes

Table 2
Associations between sociodemographic factors and smoking status.

Variables	OR	95% CI	p-value
Age	1.00	0.972-1.028	0.975
Ethnicity			
Malay			
Others (Reference)	1.04	0.526-2.081	0.897
Marital status			
Single/divorced			
Married (Reference)	0.74	0.359-1.510	0.404
Highest level of education			
Primary/secondary school			
University/college (Reference)	2.38	0.419-13.474	0.328
Number of family members who smoke cigarettes	1.48	1.239-1.767	<0.001
Clinic location			
Urban (Reference)	2.16	1.247-3.733	0.006
Rural			

OR, odds ratio; CI, confidence interval.

smoked per day was 10.1 (SD 5.8).

On binary logistic regression analysis (Table 2), associations were observed between smoking status and the number of family members who smoked and the clinic location (rural *vs* urban). Participants with a family member who smoked were significantly more likely to smoke than those without a smoking family member (OR = 1.48; 95%CI: 1.239-1.767). Participants from rural areas were significantly more likely to smoke than those from urban areas (OR=2.16; 95% CI: 1.247-3.733). No associations were found between smoking status and: participant age, marital status, ethnicity or level of education.

Knowledge about the effects of smoking on general and oral health

Table 3 shows participant knowledge about the effects of smoking on general and oral health by smoking status. Significantly more participants ($p=0.022$) who never smoked (78.4%) knew smoking can

affect gums than smokers (64.6%). Significantly more participants ($p=0.002$) who never smoked (74.8%) knew smoking can cause periodontal disease than smokers (57.6%). Significantly more participants ($p<0.001$) who never smoked (84.5%) knew smoking can cause oral cancer than smokers (66.7%). Significantly more participants ($p=0.046$) who never smoked (92.9%) knew than smoking can cause bad breath than smokers (86.9%). Significantly more participants ($p=0.03$) who never smoked (44.5%) knew smoking can alter taste than smokers (32.3%). Significantly more participants ($p=0.028$) who never smoked (38.9%) knew smoking can impair wound healing than smokers (26.3%). Significantly more participants ($p < 0.001$) who never smoked (86.7%) knew smoking can cause lung cancer than smokers (69.7%). Significantly more participants ($p=0.03$) who smoked (13.1%) knew smoking does not affect dental decay than those who never smoked (7.1%).

Table 3
 Knowledge about the effects of smoking on general and oral health by smoking status.

Participant responses about smoking and health	Smoking status, No. (%)			χ^2 p-value
	Never smoked (n=263)	Smoker/ex-smoker (n=108)	Total (N=375)	
Effect on gums ^a				
Yes	200 (78.4)	64 (64.6)	264 (70.4)	0.022
No	21 (8.2)	11 (11.1)	32 (8.5)	
Do not know	34 (13.3)	24 (24.2)	58 (15.5)	
Total	255 (100)	99 (100)		
Periodontal disease ^a				
Yes	187 (74.8)	57 (57.6)	244 (65.1)	0.002
No	21 (8.4)	19 (19.2)	40 (10.7)	
Do not know	42 (16.8)	25 (25.3)	67 (17.9)	
Total	250 (100)	101 (100)		
Oral cancer ^a				
Yes	213 (84.5)	66 (66.7)	279 (74.4)	<0.001
No	25 (9.9)	19 (19.2)	44 (11.7)	
Do not know	14 (5.6)	15 (15.2)	29 (7.7)	
Total	252 (100)	100 (100)		
Stained teeth ^a				
Yes	241 (94.5)	94 (94.9)	335 (89.3)	0.606
No	9 (3.5)	6 (6.1)	15 (4.0)	
Do not know	5 (2.0)	2 (2.0)	7 (1.9)	
Total	255 (100)	102 (100)		
Bad breath ^a				
Yes	234 (92.9)	86 (86.9)	320 (85.3)	0.046
No	13 (5.2)	11 (11.1)	24 (6.4)	
Do not know	5 (2.0)	5 (5.1)	10 (2.7)	
Total	252 (100)	102 (100)		
Dental decay ^a				
Yes	217 (85.4)	75 (75.8)	292 (77.9)	0.030
No	18 (7.1)	13 (13.1)	31 (8.3)	
Do not know	19 (7.5)	14 (14.1)	33 (8.8)	
Total	254 (100)	102 (100)		
Mouth ulcer ^a				
Yes	152 (62)	53 (53.5)	205 (54.7)	0.502
No	47 (19.2)	21 (21.2)	68 (18.1)	
Do not know	46 (18.8)	22 (22.2)	68 (18.1)	
Total	245 (100)	96 (100)		
Altered taste ^a				
Yes	109 (44.5)	32 (32.3)	141 (37.6)	0.030
No	59 (24.1)	37 (37.4)	96 (25.6)	
Do not know	77 (31.4)	30 (30.3)	107 (28.5)	
Total	245 (100)	99 (100)		

Table 3 (Continued).

Participant responses about smoking and health	Smoking status, No. (%)			χ^2 <i>p</i> -value
	Never smoked (<i>n</i> =263)	Smoker/ex-smoker (<i>n</i> =108)	Total (<i>N</i> =375)	
Impaired wound healing ^a				
Yes	95 (38.9)	26 (26.3)	121 (32.3)	0.028
No	67 (27.5)	40 (40.4)	107 (28.5)	
Do not know	82 (33.6)	31 (31.3)	113 (30.1)	
Total	244 (100)	97 (100)		
Heart disease ^a				
Yes	200 (79.4)	69 (69.7)	269 (71.7)	0.068
No	32 (12.7)	22 (22.2)	54 (14.4)	
Do not know	20 (7.9)	10 (10.1)	30 (8.0)	
Total	252 (100)	101 (100)		
Lung cancer ^a				
Yes	221 (86.7)	69 (69.7)	290 (77.3)	<0.001
No	25 (9.8)	18 (18.2)	43 (11.5)	
Do not know	9 (3.5)	15 (15.2)	24 (6.4)	
Total	255 (100)	102 (100)		

^aDenominators vary due to missing values.

Participant expectations about dentists discussing smoking habits

Table 4 shows participants perceptions about dentists providing smoking cessation advice by smoking status. Significantly more ($p=0.004$) participants who never smoked (85.5%) felt dentists should be interested in the smoking status of their patients than smokers (72.6%). Significantly more ($p=0.028$) participants who never smoked (86.9%) expected their dentists to discuss smoking with their patients than smokers (76.4%).

Participant perceptions regarding the role of dentists in smoking cessation

Significantly ($p=0.028$) more smokers (51.4%) felt their dentist should provide nothing more than oral care than those who had never smoked (41.7%). However more participants who never smoked

(69.6%) felt their dentists should provide smoking cessation advice to patients than smokers (59%) (Table 5). More participants who never smoked (59.5%) would not change to another dentist if they were asked about their smoking status during this visit than smokers (46.2%). Significantly more ($p=0.037$) participants who never smoked (61.3%) would not change to another dentists if they were asked about their smoking status at each visit than smokers (51%).

Smoker attitudes about smoking cessation counselling

Table 6 shows smoker attitudes about smoking cessation counselling. Seventy-seven point nine percent of smokers reported that they would appreciate their dentists helping them to stop smoking. Eighty-one point eight percent of smokers had a positive attitude towards den-

Table 4
Participant expectations regarding dentists discussing smoking habits.

Statements	Smoking status (N=375)		χ^2 p-value
	Never smoked	Smoker/ex-smoker	
	(n=263) No. (%)	(n=108) No. (%)	
I expect my dentist to be interested in the smoking status of his/her patients.			
Strongly agree/agree	213 (85.5)	77 (72.6)	0.004
Neither	18 (7.2)	9 (8.5)	
Strongly disagree/disagree	18 (7.2)	20 (18.9)	
Total	249 (100)	106 (100)	
I expect my dentist to discuss smoking with their patients.			
Strongly agree/agree	218 (86.9)	81 (76.4)	0.028
Neither	12 (4.8)	6 (5.7)	
Strongly disagree/disagree	21 (8.4)	19 (17.9)	
Total	251 (100)	106 (100)	

Table 5
Perceptions about the role of dentist in smoking cessation counselling by smoking status.

Statements	Smoking status (N=375)		χ^2 p-value
	Never smoker	Smoker/ex-smoker	
	(n=263) No. (%)	(n=108) No. (%)	
I would change to another dentist if the dentist asked me about my smoking during this visit.			
Strongly agree/agree	57 (23.1)	31 (29.2)	0.067
Neither	43 (17.4)	26 (24.5)	
Strongly disagree/disagree	147 (59.5)	49 (46.2)	
Total	247 (100)	106 (100)	
I would change to another dentist if the dentist asked me about my smoking at every visit.			
Strongly agree/agree	55 (22.6)	22 (21.2)	0.037
Neither	39 (16)	29 (27.9)	
Strongly disagree/disagree	149 (61.3)	53 (51)	
Total	243 (100)	104 (100)	
My dentist should provide oral care, nothing more.			
Strongly agree/agree	104 (41.7)	54 (51.4)	0.028
Neither	27 (10.8)	17 (16.2)	
Strongly disagree/disagree	118 (47.4)	34 (32.4)	
Total	249 (100)	105 (100)	
Dentists should not give smoking cessation advice to their patients.			
Strongly agree/agree	55 (22)	35 (33.3)	0.08
Neither	21 (8.4)	8 (7.6)	
Strongly disagree/disagree	174 (69.6)	62 (59.0)	
Total	250 (100)	105 (100)	

Table 6
Smoker attitudes about smoking cessation counseling.

Statements	Strongly disagree/Disagree	Neither agree nor disagree	Agree/Strongly agree	Total
I would appreciate my dentist helping me stop smoking.	13 (15.1)	6 (7.0)	67 (77.9)	86 (100)
I would appreciate my dentist advising me about the effects of smoking on my oral health.	9 (10.2)	7 (8.0)	72 (81.8)	88 (100)
I would appreciate my dentist giving me practical advice about how to stop smoking.	9 (10.2)	8 (9.1)	71 (80.7)	88 (100)
I would appreciate my dentist giving me written information about stopping smoking.	10 (11.2)	8 (9.0)	71 (79.8)	89 (100)
If my dentist referred me to a medical practitioner to stop smoking, I would go.	10 (11.2)	27 (30.3)	52 (58.4)	89 (100)
If my dentist suggested I quit smoking, I would try.	11 (12.4)	14 (15.7)	64 (71.9)	89 (100)

tists providing advice about the effects of smoking on oral health. Eighty point seven percent of smokers appreciated their dentist giving practical advice to quit smoking. Seventy-nine point eight percent of smokers claimed they would appreciate their dentists giving them written information about quitting. Seventy-one point nine percent of smokers admitted they would attempt to quit smoking if their dentists suggested they do. Fifty-eight point four percent of smokers indicated they would visit a medical practitioner to quit smoking if their dentist referred them.

DISCUSSION

In our study, the respondents were primarily middle-aged, female, Malays with a primary or secondary education level. In our study, participants from rural areas were more likely to be smokers than participants from urban areas. The possibility that urban residents experience greater exposure to anti-smoking campaigns and measures could also be a contributing factor (Lim *et al*, 2013).

In our study, fewer smokers/ex-smokers knew smoking can cause lung cancer than non-smokers, unlike some other studies where the knowledge that smoking can cause lung cancer was equally present among both smokers/ex-smokers and non-smokers (Terrades *et al*, 2009; Sood *et al*, 2014).

Significantly more smokers/ex-smokers knew smoking causes stained teeth than non-smokers and significantly more non-smokers knew smoking causes bad breath than smokers/ex-smokers. Dentist should educate their patients about these conditions when advising them to stop smoking. Fewer smokers/ex-smokers knew that smoking can cause oral cancer

than non-smokers, despite campaigns to educate the public by health organizations. More non-smokers knew that smoking can cause periodontal disease, gum problems, mouth ulcers, altered taste, and impaired wound healing than smokers/ ex-smokers. A study from England by Lung *et al* (2005) found 6% of respondents knew the link between smoking and periodontal disease. Risk factors for oral diseases and their associated determinants can be reduced by improving the awareness of healthy behaviors and health literacy (WHO, 2014). Dentists should educate their patients about the effects of smoking on periodontal health.

Significantly fewer smokers/ex-smokers than non-smokers felt dentists should be interested in their patients' smoking status and should discuss smoking cessation. Most respondents including smokers/ex-smokers felt that dentists should provide smoking cessation advice. Among smokers in this study, most had positive attitudes about smoking cessation counselling. They would appreciate it if their dentists provided practical advice and written information about quitting smoking. These findings show that dentists can play a crucial role in terms of advising and supporting their patients in smoking cessation due to the regularity of patient–dentist contacts. The World Health Organization (2003a) reported dentists can build patient interest in stopping tobacco use by showing the effects of tobacco on oral health. Routinely recording smoking history during dental check-ups and determining their level of addiction can be a good starting point to assist them to quit (Ramseier, 2003).

Both non-smokers and smokers/ex-smokers in our study stated they would not change to another dentist if their dentist asked them about smoking.

Significantly more smokers/ex-smokers believed their dentist should only provide oral care than those who never smoked. Vendrell *et al* (2010), reported if dentists would routinely encourage their patients to quit smoking, even with only modest success rates, the effect on public health would be enormous. According to the World Health Organization, dentists often spend more time with patients than other clinicians do, providing opportunities to integrate education and intervention (WHO, 2003b). Furthermore, in Malaysia the public view dentists as trustworthy and credible; thus, dentists have the ability to affect people's knowledge, attitudes, and beliefs (Naidoo and Wills, 2000).

This study had limitations. The subjects were chosen by convenience sampling. Therefore, they may not represent the general population or the population in the study area due to selection bias. Interviewing the subjects in a dental clinic setting could have resulted in biased answers. Their answers could be more health conscious or be affected by their desire to seek relief from their dental condition. Respondents may not admit their smoking status in the presence of relatives, friends or because they were at a dental clinic. The knowledge level might also not be accurate due to respondents guessing with the assumption smoking is bad. However, our results do provide an insight into the knowledge of dental patients and their attitudes towards dentists providing smoking cessation advice.

In our study smokers/ex-smokers had a lower knowledge level about the effects of smoking on oral and general health than non-smokers. Significantly more smokers/ex-smokers than non-smokers felt their dentists should be interested in their smoking status and should discuss smoking with their patients. The majority

of respondents, both smokers/ex-smokers and non-smokers felt dentists should provide smoking cessation advice. The majority of smokers/ex-smokers in this study had a positive attitude about dentists providing smoking cessation counselling.

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