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A Randomized Control Trial of Smoking Cessation Interventions Conducted by Dentists

(Percubaan Klinikal Terkawal Rawak Intervensi Berhenti Merokok oleh Doktor Pergigian)

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ABSTRACT

The objective of this study was to assess the effectiveness of the 5A's smoking cessation intervention (5A's) to that of brief advice (BA) conducted by dentists. A single-blinded randomized controlled trial was designed to compare the effectiveness of the interventions. Six Dental Public Health specialists were recruited, randomized and trained to participate in this trial. Two hundred and fifty patients were required on both arms. The main outcome measures were biochemically validated self-reported abstinence and behaviour change at 6-months follow-up. The odd of quitters in 5A's intervention was 3.81 (95% CI: 1.87-7.76; $p=0.00$) times higher compared to BA. After controlling other factors, the odds ratio for the 5A's was 1.90 (95% CI: 0.652-5.547; $p=0.24$) higher compared to BA. The 5A's was found to be more effective in initiating positive behaviour change compared to BA. However, after controlling other factors, there was no difference in the effectiveness although the odds ratio was slightly higher in 5A's.

Keywords: Brief advice; dentists; smoking cessation; tobacco cessation

ABSTRAK

Objektif kajian ini adalah untuk menilai keberkesanan intervensi berhenti merokok 5A's (5A's) berbanding nasihat ringkas (BA) yang disampaikan oleh doktor pergigian dalam klinik pergigian. Satu percubaan klinikal terkawal rawak untuk membandingkan keberkesanan 5A's berbanding BA. Enam pakar Kesihatan Awam Pergigian telah dikenal pasti secara rawak dan dilatih untuk mengambil bahagian dalam kajian ini. Dua ratus lima puluh pesakit diperlukan untuk setiap intervensi. Keputusan utama kajian adalah berhenti merokok yang disahkan secara biokimia dan perubahan tingkah laku pada rawatan susulan selepas 6 bulan. Dalam ujian klinikal, nisbah kemungkinan pesakit yang berhenti merokok dalam 5A's adalah 3.81 (95% CI: 1,871-7, 76; $p=0.00$) kali lebih tinggi berbanding BA. Selepas mengawal faktor lain, nisbah kemungkinan bagi 5A's adalah 1.90 (95% CI: 0,652-5,547; $p=0.24$) lebih tinggi berbanding BA. 5A's didapati lebih berkesan dalam memulakan perubahan tingkah laku positif berbanding BA. Walau bagaimanapun, selepas mengawal faktor lain, tidak ada perbezaan dalam keberkesanan walaupun nisbah kemungkinan yang lebih tinggi sedikit pada 5'As.

Kata kunci: Berhenti merokok; berhenti tembakau; doktor pergigian; nasihat ringkas

INTRODUCTION

Tobacco is the major cause of preventable mortality and morbidity all over the world (World Health Organization 2010). One of the globally accepted roles of dentists in prevention and health promotion is helping tobacco users to quit and tobacco cessation should be part of the practice of dentistry (Gallagher et al. 2010). A large number of oral diseases and conditions such as staining of teeth and restorations, halitosis, impaired wound healing, periodontal diseases, failure of implants and surgical treatments, acute necrotizing ulcerative gingivitis and life-threatening precancerous and cancerous lesions are attributed to smoking (Warnakulasuriya et al. 2010). In England and Wales, Unal et al. (2004) reported that between 1981 and 2000, more than half of the decrease in coronary heart disease mortality was being the reduction in smoking. This finding shows that smoking is a common risk factor (Watt & Sheiham 2012) for coronary heart disease and periodontitis (or any tobacco related oral conditions) and

that offering smoking cessation in the dental practice will impact upon patients both oral and systemic disease risk. Therefore, the involvement of primary dental care in smoking cessation will help contribute to a wider nationally coordinated tobacco control strategy (Croucher 2005).

A range of guidelines has been published globally to encourage health professionals including dentists, to deliver effective cessation advice and support (Beaglehole & Benzi 2005; Beaglehole & Watt 2004; Fiore et al. 2008; West et al. 2000; World Health Organization 2010). Dental care settings represent a clinical opportunity where patients may be receptive to cessation advice and assistance particularly if their oral health concerns can be related to tobacco use (Gordon et al. 2006). However, adoption of the 5A's (Ask, Advice, Assess, Assist, Arrange) in the routine dental care has been slow (Hu et al. 2006; Needleman et al. 2006; Warnakulasuriya 2002). Again as discussed earlier, the practice of the 5A's has limitations. Dentists have accepted the responsibility of the first two A's- Ask and

Advice, but reluctant to assess interest, assist and follow up due to time-consuming and limited knowledge (Gordon et al. 2006). However, there is no definitive conclusion about what a best practice model should look like or practically effective particularly for its implementation in the dental setting (Dawson et al. 2013). As time constraint is the commonly cited reason for not conducting smoking cessation intervention, comparing the 5A's model with the brief advice could provide understandings into the tensions and realities of providing chairside smoking cessation intervention.

In Malaysia, the standard of practice policy on smoking cessation intervention in the dental practice is unavailable. Currently, in the Ministry of Health Malaysia, dentists practiced the 5A's approach using the Malaysian Clinical Practice Guideline for Treatment of Tobacco Dependence 2003. However, most dentists refer their dental patients who want to quit smoking to the existing Quit Smoking Clinic located in most Health Centres in the Ministry of Health. Consequently, in Malaysia, the recent National Oral Health Plan for 2011-2020, provision for the first time for dental professionals to participate in and contribute to the success of the Ministry of Health's efforts in providing some form of care and advice to their patients against smoking (Oral Health Division 2011). However, the lack of time and expertise are cited commonly by dentists as barriers to undertaking this intervention (Dawson et al. 2013).

A simpler brief advice intervention (Coleman 2004; Lando et al. 2007) could offer important insights for it to be explored as a suitable method for chairside smoking cessation intervention in the dental setting. Although in Malaysia, there were dentists trained either from their undergraduate institution (Yahya et al. 2012) or on the job training (Amer Nordin et al. 2014), to relate patients' tobacco-use with their oral health diseases and to advise them to quit, there is still limited data on the acceptability, feasibility and effectiveness of the smoking cessation intervention given. Therefore, the objective in this study was to assess the effectiveness of the 5A's smoking cessation intervention (5A's) to that of brief advice (BA) which dentists delivered in a dental setting.

MATERIALS AND METHODS

This study was a single-blinded randomized controlled trial (parallel design) designed to compare the effectiveness of the 5A's smoking cessation intervention (5A's) to that of brief advice (BA) which dentists delivered in a dental setting. The primary outcome in this trial was prolonged abstinence of 30 days (Velicer & Prochaska 2004) as a self-reported outcome measure and a piCO+ carbon monoxide (CO) monitor to validate abstinence at the six-month follow-up.

Ethical clearances were obtained from the Research Ethics Committee of the University of Malaya's Faculty of Dentistry and the Ministry of Health Malaysia's Medical Research Ethics Committee (MREC). This trial is also

registered with the National Medical Research Register (NMRR) (Registration number: NMRR-13-406-15721) and the International Standard Randomised Controlled Trial Number (ISRCTN) registry (Registration number: ISRCTN 16325841) a primary clinical trial registry recognised by the World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP) and the International Committee of Medical Journal Editors (ICMJE).

There were two samples involved in this trial. First was the healthcare provider which conducted the clinical trial. Secondly were the patients who attended dental clinics for dental treatment, enrolled to participate in this trial. Dental Public Health (DPH) specialists in Selangor state were recruited as healthcare providers to deliver smoking cessation interventions in this study. The decision was based on the probability that the turnover rates would be high if general dentists were recruited for the study. Therefore, out of 14 DPH specialists in Selangor, only 6 met the inclusion criteria. The inclusion criteria were DPH specialists with five or more years of working experience who were posted at the main district clinic, were interested in this research project and were not involved in other research projects with other organizations. DPH specialists who served as the main administrators (deputy directors) or whose main clinics were located remotely from the city centre of Kuala Lumpur and those who planned to retire within the two-year period were excluded from the study.

The six DPH specialists who participated in this study were randomized equally into two intervention groups by the drawing of lots. One group was devoted to the 5A's (3 DPH specialists) and the other was devoted to brief advice intervention (3 DPH specialists). The estimated sample size of patients for this study was calculated with α value of 0.05 and desired power of 0.80. It was calculated that 226 patients were required on both arms. The final sample size estimated was 250 patients on both arms after taking 10% dropouts into consideration.

Patients enrolled did not know which interventions they received. All dental clinics enrolled patients into this study for a minimum of six months. Each DPH specialist enrolled patients who fulfilled the inclusion criteria into the assigned smoking cessation intervention program. The inclusion criteria were: smokers who attended Ministry of Health Dental Clinics in Selangor and smoked at least one cigarette in 30 days; Malaysian citizens; Adults aged between 15 and 70 years (this age range was adapted from the Malaysian Global Adult Tobacco Survey (GATS) in 2011 (Institute for Public Health 2012), a nationally representative household survey of noninstitutionalized men and women aged 15 years or older); Those who are contactable via a mobile phone or a landline; and Those who are not currently undergoing smoking cessation treatment with other health clinics.

A smoking cessation training workshop was held to train and standardize the DPH specialists in each intervention group on two separate dates. After the training, all DPH specialists involved were briefed on the clinical trial protocols. The specialists received kits containing tobacco

use assessment sheets, pamphlets and carbon monoxide (CO) monitors after the training in order to conduct the intervention in their respective dental clinics.

At baseline for both intervention groups, patients' tobacco use and nicotine dependence were assessed and recorded. All patients were asked when they started smoking, how long they had smoked the number of cigarettes they smoked in a day and the amount of money they spent on cigarettes in a month. They were also questioned about their previous quit attempts, asked to identify what their single major reason for quitting smoking would be and asked to name one major barrier to their efforts to quit smoking. Any oral health conditions associated with the patient were also recorded in the assessment form. These oral health conditions were subsequently used to personalise the advice that the DPH specialists gave patients to help them quit smoking.

Nicotine dependence was assessed using the Fagerström Test for Nicotine Dependence (FTND) questionnaire (Anne Yee et al. 2011; Heatherton et al. 1991). The levels of CO in patients' lungs were recorded using the piCO+ CO monitor. Each patient was asked to select one statement using the Contemplation Ladder questionnaire (Biener & Abrams 1991) that best fit his or her readiness to quit smoking. Based on the answer, the patient's stage of change was determined.

DPH specialists in the 5A's intervention group conducted the trial using the five steps in the 5A's intervention developed by Fiore et al. (2008). Patients in the 5A's group subsequently received assistance appropriate to his or her stage of change. Patients who were at the pre-contemplation and contemplation stages of change, the 5R's strategies (Fiore et al. 2008) were applied to increase their motivation to quit smoking. The 5R's constitute a motivational counselling intervention that emphasizes the following: Relevance to the patient, risks of smoking, rewards of quitting, roadblocks to quitting and repetition. The intervention involved talking about smoking and quitting and then reinforcing the points most likely to motivate patients to quit. Patients in the preparation stage were advised on the behavioral strategies that would help them cope with withdrawal symptoms and prevent relapses. They were given self-help pamphlets and encouraged to set a quit date within two weeks of their first visit.

For the BA group, each patient received a brief advice message to quit smoking (1-5 min) (Coleman 2004; Lando et al. 2007) regardless of at which stage they are in the stage of change. All patients from both intervention groups did not receive any nicotine replacement therapy (NRT), Varenicline, or other drugs during this intervention.

Patients from both intervention groups were followed up via telephone one month and three months after the first visit. During the six-month follow-up, patients from both groups were called for appointments with the respective DPH specialists in the dental clinic. The patients' stages of change were assessed using the Contemplation Ladder questionnaire. Each patient was asked to select

one statement that best fit his or her readiness to quit smoking. Based on the answer given, the patient's stage of change was determined. Patients were also questioned about their quitting methods, which are, whether they quit cold turkey, gradually decreased the number of cigarettes, or made no quit attempt. The levels of carbon monoxide in the patients' lungs were recorded using the piCO+ CO monitor to validate patients' self-reported abstinence.

All patients recruited from both groups were included in the intention-to-treat analysis for all follow-ups. A descriptive analysis was performed first, with categorical variables expressed as proportions and continuous variables as mean (SD). Multivariate logistic regression was used to predict abstinence at the six-month follow-up. The demographic variables and the smoking characteristics were entered in a multivariable stepwise multiple logistic regression model to determine the odds ratios (OR) and 95% confidence intervals (95% CI) for abstinence. A probability value of $p < 0.05$ was reported as significant.

RESULTS

There were 193 patients participated for the 5A's group and 207 patients for the BA group (Figure 1). Retention rates at 1-month follow-up were 65.3% (drop-out= 34.7%) for 5A's group and 79.2% (drop-out= 20.8%) for BA group. Retention rates at 3-month follow-up were 53.9% (drop-out= 46.1%) for 5A's group and 71.5% (drop-out= 28.5%) for BA group. Retention rates at 6-month follow-up were 33.2% (drop-out= 66.8%) for 5A's group and 38.2% (drop-out= 61.8%) for BA group. All patients who were lost to follow-up were mostly not contactable through telephone call either for the 1-month, 3-months follow-up or to make an appointment for the 6-months follow-up in the clinic. None claimed to withdraw or declined to participate in the trial during the follow-ups. All patients recruited from both groups were included in the intention-to-treat analysis for all follow-ups.

Table 1 shows the social characteristics of participants for 5A's and BA smoking cessation interventions. The mean age for participants in the 5A's group was 26.07 ± 12.12 years old. The mean age for participants in the BA group was 35.38 ± 10.24 years old. There was a significant difference in the age of participants between the 5A's and the BA interventions ($p < 0.001$). Most participants in both interventions were males (5A's $n=190$, 98.4%; BA $n=207$, 100%), Malays (5A's $n=178$, 92.2%; BA $n=180$, 87%) and have the highest level of education of secondary school (5A's $n=140$, 72.5%; BA $n=114$, 55.1%). Chi squared test showed a significant difference in the participants' level of education ($p < 0.001$). A significant difference ($p < 0.001$) was similarly observed in terms of marital status whereby; most participants in the 5A's group were single ($n=117$, 60.7%), while most participants the BA group were married ($n=153$, 73.9%).

Table 2 describes the smoking characteristics and nicotine dependence of participants in the 5A's and BA smoking cessation interventions. The mean age of

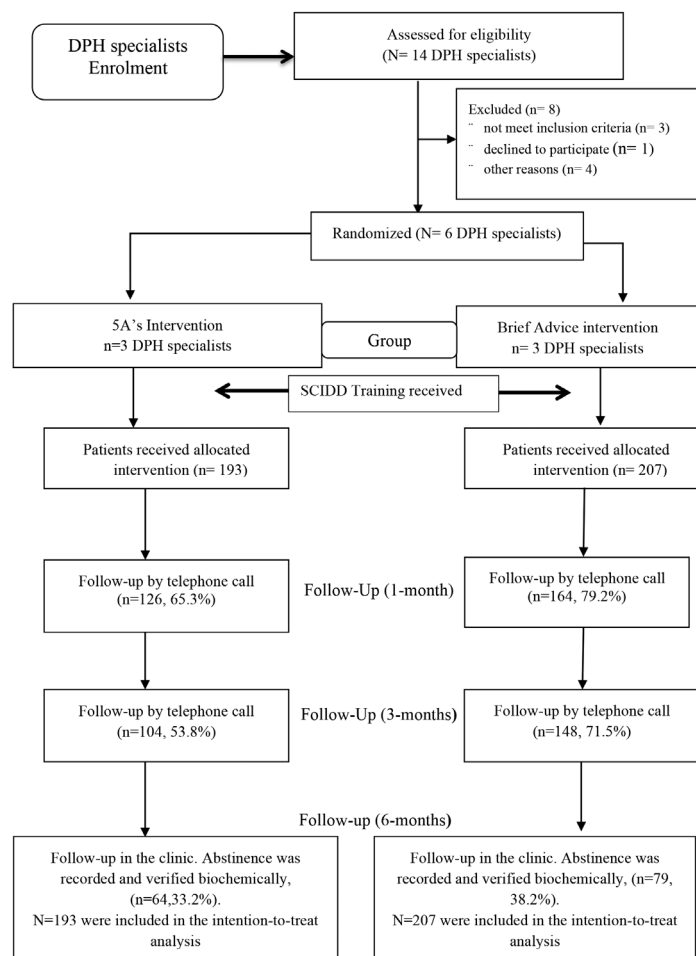


FIGURE 1. Flow Diagram of the Dental Public Health Specialists and participants in the 5A's model group and the BA group. Adapted from CONSORT (2010)

TABLE 1. Social characteristics of participants enrolled for 5A's model and BA smoking cessation interventions

Characteristics	Types of smoking cessation intervention		<i>p</i> -value
	5As (N=193)	BA (N=207)	
Age (years) Mean \pm SD	26.07 \pm 12.12	35.38 \pm 10.24	<i>p</i> <0.001 ^a
Gender:			
Male, n (%)	190 (98.4)	207 (100)	
Female, n (%)	3 (1.6)	0 (0)	0.230 ^b
Ethnic:			
Malay, n (%)	178 (92.2)	180 (87)	
Chinese/Others, n (%)	2 (1)	15 (7.2)	
Indian, n (%)	13 (6.74)	12 (5.8)	0.009 ^b
Marital status:			
Single, n (%)	117 (60.7)	53 (25.6)	
Married, n (%)	76 (39.4)	153 (73.9)	<i>p</i> <0.001 ^b
Highest level of education:			
Primary school, n (%)	3 (1.6)	22 (10.6)	
Secondary school, n (%)	140 (72.5)	114 (55.1)	
Certificate/Diploma, n (%)	32 (16.6)	51 (24.6)	
Degree, n (%)	16 (8.3)	6 (2.9)	<i>p</i> <0.001 ^b

^a Mann-Whitney U test ; ^b χ^2 test

TABLE 2. Smoking characteristics and nicotine dependence of participants in 5A's and BA smoking cessation interventions

Characteristics	Types of smoking cessation intervention		<i>p</i> -value
	5A's (N=193)	BA (N=207)	
Age started smoking (years)			
Mean \pm SD	14.92 \pm 3.11	17.71 \pm 4.02	<i>p</i> <0.001 ^a
Duration of smoking (years)			
Mean \pm SD	11.35 \pm 10.23	17.40 \pm 9.94	<i>p</i> <0.001 ^a
No. of cigarettes per day (sticks)			
Mean \pm SD	9.94 \pm 8.3	11.60 \pm 7.86	0.042 ^a
Money spent per month (RM)			
Mean \pm SD	147.09 \pm 121.96	169.43 \pm 129.68	0.085 ^a
Tried quitting before:			
Yes, n (%)	165 (85.5)	173 (83.6)	
No, n (%)	28 (14.5)	34 (16.4)	0.348 ^b
If Yes, how many times?			
Mean \pm SD	2.73 \pm 3.07	2.35 \pm 2.10	0.161 ^a
^c Level of nicotine addiction:			
Very low dependence, n (%)	107 (55.4)	129 (62.3)	
Low dependence, n (%)	46 (23.8)	50 (24.2)	
Moderate dependence, n (%)	18 (9.3)	11 (5.3)	
High dependence, n (%)	15 (7.8)	17 (8.2)	0.404 ^b
^d Level of CO in lungs:			
Low (1-6ppm), n (%)	38 (19.7)	17 (8.2)	
Moderate (7-10ppm), n (%)	47 (24.4)	41 (19.8)	
High (11ppm or more), n (%)	108 (56.0)	149 (72.0)	0.001 ^b

^a Mann-Whitney U test; ^b χ^2 test^c Fagerström test for nicotine dependence (FTND) ; ^d CO breath analyser

participants started smoking were significantly younger in the 5A's group (14.92 \pm 3.11 years old) compared to participants in the BA group (17.71 \pm 4.02 years old). The mean duration of being a smoker was significantly shorter for 5A's (11.35 \pm 10.23 years) compared to BA (17.40 \pm 9.94 years). All participants enrolled for both interventions were mostly cigarette smokers. The mean number of cigarettes taken by the smokers per day was 9.94 \pm 8.3 sticks for 5A's while for BA was 11.60 \pm 7.86 sticks. The difference was statistically significant (*p*=0.042). The participants in the BA group spent more money on cigarettes per month, which was 169.43 \pm 129.68 MYR compared to 5A's group (147.09 \pm 121.96 MYR). However, the difference was not statistically significant (*p*=0.085). The proportion of

participants with high level of CO in lungs was significantly higher in the BA group than the 5A's group.

Table 3 shows the participants abstinence rate at 1-month, 3-months and 6-months follow-up. Chi-squared test showed a statistically significant difference between the smoking cessation interventions and abstinence of participants at 1-months (*p*=0.006), 3-months (*p*=0.015) and 6-months of follow-up (*p*<0.001). The rate of abstinence increased at 1-month and 3-months follow-up for both interventions. However, quitting decreased by 1.1% for 5A's group and by 4.8% for BA group at 6-months follow-up. Only 34 (17.6%) participants in 5A's group quit smoking compared to 11 (5.3%) participants in BA group at 6-months follow-up. The percentage of

TABLE 3. Abstinence at 1-month, 3-months and 6-months follow-up for BA and 5A's model of smoking cessation interventions

Interventions	Abstinence from smoking					
	1-month		3-months		6-months	
	Quit	No quit	Quit	No quit	Quit	No quit
5A's (N=193)	32 (16.6)	161 (83.4)	36 (18.7)	157 (81.3)	34 (17.6)	159 (82.4)
BA (N=207)	16 (7.7)	191 (92.3)	21 (10.1)	186 (89.9)	11 (5.3)	196 (94.5)
χ^2 <i>p</i> value	0.006		0.015		<0.001	

participants with no abstinence for both interventions was seen decreasing during the 3-months follow-up. However, at 6-months follow-up, the trend increases slightly for both interventions. About 94.5% ($n=196$) of participants in the BA group did not quit smoking compared to 82.4% ($n=159$) of participants in the 5A's group.

Table 4 categorizes smokers according to the level of carbon monoxide breath analysis. Sixty-four participants from the 5A's group and 79 participants from the BA group came for follow-up at 6-months in the dental clinic. Therefore, only these participants were able to conduct the biochemical validation test for abstinence. A statistically significance was seen for each intervention between the type of smokers and quitting ($p < .0001$). The strength of this trial was the use of a confirmative evaluation of the smoking cessation interventions with a comparison of abstinence verified chemically using a carbon monoxide analyser on an intent-to-treat basis. A cut off point of more than 11 ppm of CO is considered as a smoker, 7-10 ppm as a light smoker and 0-6 ppm as a non-smoker (Bedfont Scientific Ltd. 2012). It was observed that participants who quitted had a low CO level in their lungs (0-6 ppm). However, some quitters had 7-10 ppm of CO levels; this may be due to the exposure to air polluted with CO such as car exhaust at their workplace or home.

Table 5 shows the predictors of quitting at 6-months follow-up using binary logistic regression. A binary logistic regression analysis using abstinence at 6-months follow-up as the dichotomous criterion variable (code 0=no quit; code 1= quit) and type of smoking cessation interventions (5A's and BA) as predictor variable were carried out. The OR (95% CI) for those who quit in the 5A's group was 3.81(1.871-7.76) higher compared to BA. There was a statistically significant difference between the smoking cessation interventions and quitting ($p < 0.001$). Therefore, the types of intervention did predict quitting at 6 months follow-up as shown in model 1 in Table 5.

When the social demographic variables (age, ethnic, marital status and highest level of education) were controlled, the OR (95% CI) for the 5A's was 2.11(0.917-4.889) higher compared to BA. Nonetheless, there was no significant difference between the smoking cessation interventions and quitting after controlling age, ethnic, marital status, and highest level of education as shown in

Model 2 (Table 5). Finally, the smoking characteristics of the participants (age started smoking, duration of smoking, number of cigarettes taken per day, money spent per month, tried quitting before, FTND and level of CO in lungs) were added to create the third model. In this model, the OR (95% CI) for the 5A's was 1.90 (0.652-5.547) higher compared to BA. Again, there was no significant difference found between the smoking cessation interventions and quitting after controlling social demographic variables and smoking characteristics of the participants (Table 5). Only the level of CO in lungs was significant.

DISCUSSION

The unit of randomization in this trial was the DPH specialists and their age range was 49 to 54 years old; five were females and had clinical practice experience of 25 to 30 years. As these specialists were assigned to different clinics, thus this was similar to 5 dental offices studies in the Carr and Ebbert review (2011) where the dental office was the unit of randomization. However, the 6 DPH specialists were trained and standardized according to the smoking cessation interventions they were allocated to, and followed strict clinical protocol. A post hoc subgroup analysis of studies conducted in dental practices (settings) found that a minimum brief counselling to adult smokers showed a significant benefit of intervention compared to usual care or less treatment intensive controls with no evidence of heterogeneity (Carr & Ebbert 2011). Apart from the smoking cessation interventions, the specialists in this trial conducted routine oral examination, personalised counselling from the examination as to oral effects to tobacco use, and self-help materials in accordance with the majority of the studies reported in the Cochrane review (Carr & Ebbert 2011).

Smokers participated in this trial were mostly men, middle-aged, had high nicotine dependency and wanting to stop smoking mainly for health reasons. The majority of men participated in this trial may reflected the 43.9% (4.64 million) of Malaysian men aged 15 years or older were current cigarette smokers in 2011 and only 1.0% (0.10 million) are women from a national survey (Institute for Public Health 2012). A similar result was also reflected by Wee et al. (2011), where most smokers were male

TABLE 4. Level of carbon monoxide (ppm) at 6-months follow-up for BA and 5A's model of smoking cessation interventions

Interventions		Level of carbon monoxide (ppm)			Total n(%)	P-value
		0-6 ppm (Non-smoker) n (%)	7-10 ppm (Light smoker) n (%)	>11 ppm (Smoker) n (%)		
5A's (N=64)	Quit	29 (51.8)	4 (7.1)	0 (0)	33(51.6)	<0.001
	No quit	9 (16.1)	12 (21.4)	10 (18.0)		
BA (N=79)	Quit	8 (10.1)	3 (3.8)	0 (0)	11(14.0)	<0.001
	No quit	9 (11.4)	18 (22.8)	41(51.9)		

TABLE 5. Predictors of abstinence at 6-months follow-up using binary logistic regression

Variables	Model 1 OR (95% CI)	<i>p</i> -value	Model 2 OR (95% CI)	<i>p</i> -value	Model 3 OR (95% CI)	<i>p</i> -value
Interventions:						
BA(reference)	3.81(1.871-7.76)	<0.001	2.11(0.917-4.889)	0.079	1.90(0.652-5.547)	0.240
5A's						
Age			1.044(0.989-1.103)	0.117	1.126(0.846-1.499)	0.416
Ethnic:						
Malay (reference)			0.872(0.277-2.748)	0.815	0.550 (0.109-2.780)	0.470
Others						
Marital status:						
Single (reference)			0.583(0.198-1.713)	0.326	0.407(0.106-1.569)	0.192
Married						
Highest level of education:						
Primary/SecondarySchool (reference)			0.856(0.378-1.935)	0.708	1.240(0.422-3.647)	0.696
Diploma/Degree						
Age started smoking					0.925(0.674-1.268)	0.627
Duration of smoking					0.892(0.672-1.185)	0.430
No. of cigarettes taken per day					1.053(0.952-1.165)	0.318
Money spent on cigarette per month					1.006(1.0-1.013)	0.055
Variables	Model 1 OR (95% CI)	<i>p</i> -value	Model 2 OR (95% CI)	<i>p</i> -value	Model 3 OR (95% CI)	<i>p</i> -value
Previous attempt to quit:						
Yes (reference)					0.974(0.358-2.651)	0.959
No						
Level of nicotine addiction (FTND):						
Low (reference)					2.583(0.569-11.721)	0.219
Mod/High						
Level of CO in lungs:						
Low/Moderate (reference)					0.326(0.139-0.766)	0.010
High						

but again these data were collected in a health setting. Nonetheless, a study in Japan by Hanioka et al. (2010) found the smokers attended quit smoking clinics in dental clinic were predominantly male. However, trials conducted by other studies (Gordon et al. 2007; Nohler et al. 2009) recruited more females due to the fact that women were more willing to seek and accept support for smoking cessation compared to men.

In this study, abstinence during all follow-ups was significantly found to be higher for participants in the 5A's group compared to BA group. However, the data fluctuate with increasing number of patients with 7-day abstinence at 3-month but later decreased at 6-month follow-up. However, after controlling for age, ethnic, marital status and level of education, patients in the 5A's group was 2.11 times likely to quit at 6-month compared to brief advice, but was not statistically significant. Consequently, when the smoking characteristics of smokers were controlled, only the type of smoker (level of CO in lungs) had a statistically significant influence on the probability of abstinence at 6-month follow-up. At this time, patients in the 5A's

group were 1.9 times likely to quit at 6-month compared to brief advice but was also not statistically significant. These results were similar to a US study comparing 5A's and 3A's, where more patients quit in the 5A's condition than those in the 3A's but was not significant (Gordon et al. 2007). The higher abstinence in the 5A's group were because the 5A's behavioural therapy in this study assessed participants' readiness to change as a guide to identify which appropriate method to apply on patients to assist them to quit smoking. On the contrary, BA only provides brief advice regardless of assessing participants' readiness to change. This is due to the following reasons pertaining to the behavioural therapy aspects.

Firstly, using the stage of change as a guide in the step- assess in 5A's, participants in the preparation stage allows them to decide to commit to making changes, ready to start taking action in the future or likewise. Motivational questions propose to smokers opportunistically even in the dental setting may trigger and can initiate them to decide to quit smoking. However, as stated by Báezconde-Garbanati et al. (2011), the plans to quit at preparation stage should

focus on dealing with obstacles to quitting and possible withdrawal symptoms. Certain situations either socially or psychologically may trigger them to start smoking again. Such situations include drinking coffee or alcoholic drinks, after meal time or being around smoking friends (Báezconde-Garbanati et al. 2011).

For patients who were unwilling to make a quit attempt the 5A's intervention were more towards promoting motivation to quit (Fiore et al. 2008). These patients were either in the contemplation or pre-contemplation stage. Patients who are in the contemplation stage indicated that they are beginning to aware that change is necessary but is ambivalent about it (Biener & Abrams 1991). In order to increase quit attempts, motivational interviewing strategies using the 5R's (relevance, risks, rewards, roadblocks and repetition) is effective if used for contemplators (Fiore et al. 2008). Smokers in the pre-contemplation stage are not interested in quitting and can be very defensive when given advice to quit (Biener & Abrams 1991). Asking pre-contemplators to give reasons on what would make them consider quitting may help them to move to the contemplation stage (Báezconde-Garbanati et al. 2011). Thus, first step of 5A's (Ask) could be a possible initiation of the smoking cessation treatment on the chair-side.

The strength of the 5A's intervention is explained by the motivation component in behaviour change method. The 5A's is also consistent with MI technique which focuses on exploring a smokers' feelings, beliefs, ideas, and values on tobacco use to uncover any ambivalence about tobacco use (Fiore et al. 2008). When these theories were discussed with the clinicians, the reasons, ideas, and needs to eliminate tobacco use may initiate an action to change smoking behaviour. The components of steps-Assess, Assist and Arrange in the 5A's were the extra strength that BA do not have. Combining self-regulation and social support involving families, friends or colleagues are important to increase their motivation to quit smoking (Ochsner et al. 2014).

In this study, findings show that BA was not delivered as extensive as the 5A's regardless of the motivational component that both had to change behaviour. Although, a recent Cochrane review by Stead et al. (2013) suggested that providing a follow-up appointment may increase the effect, however our study shows otherwise. Despite the same number of follow-ups given to participants in both interventions, only about a third quit smoking with BA. However, researchers found that BA is effective for smokers who are strongly motivated to quit (Coleman 2004; Fiore et al. 2008). Thus, BA intervention may be a preferable option as the first treatment option since it is cheaper and less time consuming, although the effect might not be equivalent as of 5A's (Stead et al. 2013). In his review, Stead et al. (2013) also pointed out that the proportion of physicians offering advice to quit is more important and provides greater public health benefits. Thus, BA could be suggested as a treatment for smoking cessation integrated with other dental treatments treating smoking-related oral diseases or conditions in the primary dental care.

Studies have shown that brief advice is one of the most cost-effective interventions in medicine and is shown to be an effective means of smoking cessation in smokers with established smoking-related disease (Coleman 2004; Lancaster & Stead 2005; West et al. 2015). Moreover, West et al. (2015) analysed in his review that BA from a trained health care worker can have a small but important effect in promoting smoking cessation in any health-care system.

There were several limitations that needed to be addressed. The recruitment of Dental Public Health (DPH) specialists was considered for this study due to the high turnover rate of general dentists in the health system. The smoking cessation provider needs to be allocated at the designated dental clinic for at least one year during the trial period. The age range and years of clinical experience of the DPH specialists were almost similar. This will minimise the variations in counselling patients. In reality, the variation in personality traits of the specialist or dentists may affect the outcomes of the counselling. Future study may want to look for information on how dentists' personality characteristics may be effect the success of smoking intervention.

There were problems in contacting the patients for their follow-ups. Patients were not easily contactable or had to be contacted more than twice for the follow-ups to be done. Some patients requested to be contacted at odd hours away from the time allocated for the investigators to conduct the follow-ups via telephone calls. Some patients tend to provide their telephone numbers, answered the first follow-up call, but were reluctant to answer the next time. Again, if an appointment were given to them for their 6-month follow-up, some failed to attend. Thus, our inability to recruit patients as expected and to deliver the full intervention to patients who did enrol raises important issues and a cautionary note for future research and intervention.

In conclusion, dentists are well positioned to influence smokers to quit regardless of either by the used of 5A's or BA in smoking cessation intervention. The components of steps- Assess, Assist and Arrange in the 5A's were the extra strength that BA do not have. During the steps- Assess and Assist, the counselling technique in 5A's focuses on discovering smokers' feelings, beliefs, ideas and values on tobacco use to discover any ambivalence about tobacco use (Fiore et al. 2008). Therefore, the reasons, ideas and needs to eliminate tobacco use may initiate an action to change a person's smoking behaviour. Thus, the 5A's model should be offered to those who are unable to quit upon BA intervention and needed an additional intense motivational intervention.

BA intervention may be a preferable option as the first treatment option integrated with other dental treatments treating smoking-related oral diseases or conditions in the primary dental care since it is cheaper and less time consuming. Stead et al. (2013) discussed that the proportion of physicians offering advice to quit is more important and provides more public health benefits. This was supported by West et al. (2015) which also agree that BA from a

trained health care worker may be insignificant but has an important effect in promoting smoking cessation in any health-care system. Studies have shown that brief advice is one of the most cost-effective interventions in medicine and is shown to be an effective means of smoking cessation in smokers with established smoking-related disease (Coleman 2004; Lancaster & Stead 2005). Thus, this may well be applied to smoking-related oral diseases too.

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