

RESEARCH ARTICLE

The effect of faith-based smoking cessation intervention during Ramadan among Malay smokers

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ABSTRACT

Objectives: To study the effects of a faith-based smoking cessation intervention during Ramadan among Malay male smokers working in public offices.

Methods: This was a quasi-experimental study conducted during Ramadan 2015. The intervention was developed based on the constructs within the Theory of Planned Behaviour. The intervention intended to increase the intention and the perceived behaviour control to stop smoking among Muslim smokers during Ramadan. The outcomes measured were changes in the Fagerstrom Test for Nicotine Dependence score and saliva cotinine levels. Data were collected at baseline (5 days before Ramadan), during Ramadan (21st day of Ramadan) and post-Ramadan (21 days after Ramadan). Statistical tests to examine changes within and between groups were carried out and the significance level was set at $p < 0.05$.

Results: During Ramadan, the saliva cotinine level decreased significantly in both groups ($p = 0.001$ in the control group and $p = < 0.001$ in the intervention group). However, after Ramadan, it remained significant only in the intervention group ($p = 0.025$). A significant change between the groups was only noticed during Ramadan ($p = 0.049$).

Conclusion: The reduction in the saliva cotinine level was found to be more sustainable post-Ramadan in the intervention group. This finding could indicate the positive effect of using this culturally-competent intervention to encourage smoking cessation during Ramadan.

Keywords: smoking cessation, Ramadan, Muslim smokers

INTRODUCTION

The prevalence of smoking among adult males in Malaysia is 46.5% (95% CI: 45.5 – 47.4%), and is significantly associated with ethnicity, where the Malays make up the majority of smokers when compared with other ethnic groups with a reported prevalence of 55.9%.¹ The Malaysian government have carried out many anti-tobacco efforts to reduce the prevalence of smoking, which include health campaigns to discourage smoking initiation and encourage cessation. Among the health campaigns to discourage smoking initiation is the "Tak Nak", i.e., "Say No" to smoking campaign, while initiatives to encourage smoking cessation include the "Nafas Baru Bermula Ramadan" (which literally means "new breath starting Ramadan") campaign and the promotion of quit smoking clinics, which provide counselling sessions in health facilities and pharmacies, with or without using nicotine replacement for smoking cessation.²

Ramadan is a month in the Islamic calendar when Muslims observe a month-long obligatory fasting period. This involves complete abstention from food, drink or smoking from sunrise till sunset. Particularly in Muslim countries, Ramadan provides a very unique environment where the usual environmental influences that are perceived as barriers to cease smoking, such as pro-smoking living and working environments and smoking cultural norms³ can be overcome by default during this month as almost no one smokes in public during the day throughout this month. Thus, specifically for Muslim smokers, a religious-themed smoking cessation campaign which encourages Muslims to quit smoking during Ramadan has been promoted for decades. The Ramadan smoking cessation programme was initiated following the observation that Muslim smokers were able to refrain from smoking when fasting during Ramadan.⁴

Ramadan smoking cessation initiatives have been carried out worldwide and many studies have been conducted in relation to it. For example, the London-wide Ramadan campaign reported that more than 83% of Muslims in London showed a positive attitude towards smoking cessation during Ramadan,⁵ while another study in Karachi reported that 91% of smokers who attended a smoking cessation clinic gave up smoking during the month of Ramadan.⁶ Similarly in Malaysia, this religiously themed smoking cessation campaign called *Nafas Baru Bermula*

Ramadan has been carried out nationwide annually before the start of Ramadan to encourage Muslim smokers to start their smoking cessation efforts during Ramadan. However, the uptake of this programme varies at the grass roots level, one of the problems being that no specific programme content has been developed. A survey reported that 96.7% of Muslim smokers in Malaysia feel that stopping smoking during Ramadan is easier compared to other months.⁷

This aim of this research was to study the effect of a faith-based smoking cessation intervention programme during Ramadan among Malay male smokers working in public offices. Although Ramadan itself provides a very conducive environment for smoking cessation, a complementary smoking cessation intervention could further increase its acceptance and sustainability. Furthermore, studies have shown that interventions which are developed specifically for a targeted group (tailored-intervention) might increase its acceptance and level of effectiveness, which has shown success in culturally tailored smoking cessation interventions among Arab American⁸ and Chinese American males,⁹ as well as adult American Indians.¹⁰

METHODS

This was a quasi-experimental study conducted during Ramadan 2015. Two local authorities in Selangor, Malaysia were selected. One was assigned as the intervention group and the other as the control. The sample size calculated comprised 62 respondents per arm. This study focused on male smokers only as the prevalence of female smokers in Malaysia is only 2.9%.¹¹ The respondents were randomly selected from the list of Malay male smokers who are employed in the selected local authorities. Inclusion criteria for this study were current smokers who had smoked 100 cigarettes in their lifetime and currently smoke cigarettes every day and are smokers of cigarettes only. Thus, those smoking other forms of tobacco were excluded. The outcomes monitored were nicotine dependence and saliva cotinine levels.

Nicotine dependence was measured using the Fagerstrom Test for Nicotine Dependence (FTND) score questionnaire. Saliva samples were analysed using the Salimetrics salivary cotinine test. The saliva samples were centrifuged using the KUBOTA 2100 compact tabletop centrifuge and analysed in a fully automated ELISA machine ("Adaltis Personal Lab") in

Table 1. Comparison of sociodemographic characteristics between the respondents in intervention and control groups at baseline.

Characteristics	Intervention (<i>n</i> = 38)	Control (<i>n</i> = 61)	<i>p</i> ^a
	<i>n</i> (%)	<i>n</i> (%)	
Marital status			0.805
Single/divorced	8 (21.1)	13 (24.1)	
Married	30 (78.9)	41 (75.9)	
Education level			0.096
High school	19 (50.0)	41 (67.2)	
Tertiary level	19 (50.0)	20 (32.8)	
Employment position			0.168
Technical/clerical	25 (68.8)	48 (78.7)	
Managerial	13 (34.2)	13 (21.3)	
Field work			0.832
<3 days per week	16 (42.1)	25 (46.3)	
≥3 days per week	22 (52.9)	29 (53.7)	

^a Chi-squared test, significant at *p* < 0.05.

the pathology laboratory at Universiti Putra Malaysia. The optical density obtained was reported in ng/ml. Nicotine dependence and saliva cotinine levels were measured three times: pre-Ramadan (as the baseline), end of Ramadan (after the 21st day of Ramadan) and one month post-Ramadan. It was hypothesised that FTND scores and saliva cotinine levels would be lower during Ramadan and post-Ramadan in the intervention group when compared with the control group.

The baseline data collection was carried out five days before Ramadan. The intervention was carried out right after baseline data collection. The respondents in the intervention group received an intervention booklet that was developed for this study. The booklet consisted of 10 parts. The first part was the introduction to the programme, the second part was a pledge to quit smoking, the third part was a section to enhance smokers' knowledge on the harmful effects of smoking for both smokers and non-smokers, the fourth part consisted of religious rulings on smoking, the opportunity within Ramadan to start smoking cessation and lastly the benefits of smoking cessation. The fifth part contained tips for smoking cessation, the sixth part contained tips on how to keep on track after suffering a lapse during the programme; the seventh, eighth and ninth parts provided a list of motivational tips to maintain efforts and perseverance and finally the booklet closed with religious encouragements. At the end of every statement in every part of the booklet, a box was provided for the

respondents to tick. The researcher gave the respondents a detailed walk-through of the booklet. The whole process took approximately one hour.

This intervention was developed based on the constructs in the Theory of Planned Behaviour (TPB). TPB combines social influences and personal factors as predictors. The components that contribute to behaviour change are intention, attitude, subjective norms and perceived behaviour control. Although Malaysia had adopted the "*fatwa*" (religious ruling) that smoking is "*haram*" (religiously forbidden), the choice to smoke is up to the individual. However, the uniqueness of the Ramadan environment, particularly in Malaysia, has made a new temporary norm of no smoking in public during the day for the whole month.

The walk-through exercise of the booklet was meant to increase the respondents' positive attitude toward smoking cessation. The intervention was hoped to positively change all the components of the TPB, which would in turn contribute to increased intention, which is the main predictor of smoking behaviour.¹¹ The control group did not receive any smoking cessation intervention from the researchers, but they may still have been exposed to other smoking cessation programmes that were carried out by other parties either at the national or local level.

Data collection in the intervention and control group was carried out at about the same time (1–3 day difference). The non-smoker status during Ramadan and post-Ramadan was verified by quantifying the

Table 2. Comparison of mean age, income and saliva cotinine levels between the respondents in intervention and control groups at baseline.

Characteristics	Intervention (<i>n</i> = 38)		Control group (<i>n</i> = 61)		<i>p</i> ^a
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Age (year)	35.23 (7.51)	31.90 (6.68)	31.90 (6.68)	31.90 (6.68)	0.045*
Income (RM)	3690 (2647)	2760 (1491)	2760 (1491)	2760 (1491)	0.071
Saliva cotinine level (ng/ml)	93.73 (11.64)	81.99 (21.09)	81.99 (21.09)	81.99 (21.09)	0.002*
FTND score	3.87 (2.15)	4.51 (1.95)	4.51 (1.95)	4.51 (1.95)	0.129

^aIndependent *t* test, *significant at *p* < 0.05.

cotinine saliva levels. Those who exhibited a cotinine saliva level of 1 ng/ml or less were certified with the non-smoker status (stop smoking).

Data were analysed by using IBM SPSS Statistics for Windows, version 21. In handling loss of follow-up, this study adopted the use of the intention to treat (ITT) method. All respondents were included in the analysis according to their original assignment. Those who stopped smoking during Ramadan and after Ramadan were not omitted from the analysis of data. Paired *t*-test and one-way ANOVA were used to analyse the changes in saliva cotinine levels within groups, while the repeated measures ANOVA test (time × group) was used to compare the changes between the intervention and control groups. The significance level was set at *p* < 0.05.

RESULTS

Tables 1 and 2 indicate that at baseline, the respondents' sociodemographic characteristics were comparable except for the mean age and saliva cotinine levels which were higher in the intervention group.

Table 3 shows the number of respondents who stopped smoking or added vape smoking during and after Ramadan in the intervention and control groups. Those who did not turn up for follow-up were assumed to still be smoking cigarettes only.

Table 4 outlines the changes in the FTND score and saliva cotinine levels within groups. The FTND score in the intervention group shows no significant change, but the FTND score in the control group shows significant reduction from the baseline period to during Ramadan and after Ramadan (*p* = 0.001, *p* = 0.003). On the other hand, the decreased saliva cotinine levels in the intervention group was significant during Ramadan and remained significant after Ramadan (*p* = <0.001, *p* = 0.025). Although the decreased saliva cotinine levels during Ramadan in the control group was also significant (*p* = 0.001), it did not remain significant after Ramadan.

Table 5 shows the results of comparing the trend of the FTND score and changes in saliva cotinine levels between the intervention and control groups. A comparison of the trend of FTND score changes between intervention and control groups during Ramadan and after Ramadan show no significant

Table 3. Number of respondents according to their smoking status before, during and after Ramadan and the number of respondents analysed in the intervention and control groups.

Smoking status	Intervention group (<i>n</i> = 38)			Control group (<i>n</i> = 61)		
	Before Ramadan	During Ramadan	After Ramadan	Before Ramadan	During Ramadan	After Ramadan
Stopped smoking		3 (7.9%)	1		4 (6.6%)	5
Still smoking	38	35 (92.1%)	37	61	57 (93.4%)	56
– Cigarettes only		22 + 11*	23 + 7*		44 + 7*	38 + 15*
– Cigarettes + vape		2	7		6	3
Total number of participants analysed	38	38	38	61	61	61

*Number of participants who did not turn up for follow-up.

Table 4. Changes in FTND scores and saliva cotinine levels (ng/ml) from the baseline period (before Ramadan) to during and after Ramadan within the intervention and control groups.

	Mean (SD)	Pair	p^a	F	p^b
FTND score					
Intervention group					
Before Ramadan	3.87 (2.15)			0.070 (2)	0.932
During Ramadan	3.56 (2.25)				
After Ramadan	3.71 (1.90)				
		(1)-(2)	0.448		
		(1)-(3)	0.610		
		(2)-(3)	0.714		
Control group					
Before Ramadan	4.51 (1.94)			3.021 (2)	0.051
During Ramadan	3.48 (2.06)				
After Ramadan	3.63 (2.09)				
		(1)-(2)	0.001*		
		(1)-(3)	0.003*		
		(2)-(3)	0.497		
Saliva cotinine level (ng/ml)					
Intervention group					
Before Ramadan	93.73 (11.64)			4.978 (2)	0.09
During Ramadan	70.68 (32.24)				
After Ramadan	83.28 (25.72)				
		(1)-(2)	<0.001*		
		(1)-(3)	0.025*		
		(2)-(3)	0.014*		
Control group					
Before Ramadan	81.99 (21.06)			1.902 (2)	0.152
During Ramadan	70.28 (31.19)				
After Ramadan	78.32 (32.82)				
		(1)-(2)	0.001*		
		(1)-(3)	0.223		
		(2)-(3)	0.080		

^aPaired *t* test, *significant at $p < 0.05$.

^bOne-way ANOVA,*significant at $p < 0.05$.

difference. However, a comparison of the trend of changes in saliva cotinine levels between intervention and control groups shows a significant difference during Ramadan ($p = 0.045$), but a comparison of the trend up to post-Ramadan shows no significant difference.

DISCUSSION

This study was carried out in Ramadan 2015. The inclusion criteria was cigarette smokers while the exclusion criteria was smoking other forms of tobacco including e-cigarettes. The exclusion of smokers who smoke other forms of tobacco was not initially perceived to have much of an effect on the study

outcomes because up until 2013, it was reported that the prevalence of e-cigarette use in Malaysia was only 3.9%.¹² However, during the study period, Malaysia was suddenly caught in the "vaping phenomenon". The vaporizer (also known as e-cigarette) practice has become "viral" and its related businesses have bloomed rapidly. It has been claimed that Malaysia has at least 400,000 to 1 million vapers and it is the second-biggest market in the world.¹³ It has become one of the most popular issues discussed not only from the aspect of health and economy, but also from the aspect of politics and religion.¹⁴ Within two months of the study duration, 22.6% of the respondents in the intervention group and 9.83% in the control group had started to vape. Nevertheless,

Table 5. Comparison of changes in the FTND score and saliva cotinine levels (ng/ml) between intervention and control groups.

	Intervention group (n = 38)	Control group (n = 61)	Comparison between groups			
	Mean (SD)	Mean (SD)	(1) and (2)		(1), (2) and (3)	
			F stat (df)	p ^b	F stat (df)	p ^b
FTND score						
Before Ramadan	3.87 (2.15)	4.51 (1.94)				
During Ramadan	3.56 (2.25)	3.48 (2.06)	2.722 (1)	0.103		
After Ramadan	3.71 (1.90)	3.63 (2.09)			2.060 (2)	0.132
Saliva cotinine level (ng/ml)						
Before Ramadan	93.73 (11.64)	81.99 (21.06)				
During Ramadan	70.68 (32.24)	70.28 (31.19)	4.024 (1)	0.045*		
After Ramadan	83.28 (25.72)	78.32 (32.82)			1.788 (2)	0.171

^b Repeated-measure ANOVA (*time × group effect*), *significant at $p < 0.05$.

since the study had adopted the use of the ITT protocol, all respondents were included in the analysis according to their original assignment.

The response rate in the intervention group unfortunately was low (61.3%), but was high in the control group (98.4%). At baseline, the respondents in the intervention group were older and their cotinine saliva levels were higher. Data collection during the study period showed no significant reduction in the FTND score in both groups. However, there were significant reductions in the mean saliva cotinine levels in both groups. The reduction in saliva cotinine levels could have been due to the reduction in the number of cigarettes smoked during Ramadan by respondents from both groups. This finding is similar to the findings of other studies in Malaysia which show that the number of cigarettes smoked reduced significantly during Ramadan even without any intervention.^{6,15,16} In general, Muslim smokers refrain from smoking during the daytime in Ramadan since smoking nullifies fasting. In most Muslim countries, such as Malaysia, it is not religiously and culturally acceptable for a Muslim smoker to smoke in public or even at home during the day in Ramadan. Thus, even if the smoker was not fasting during Ramadan, he would feel pressured to conform to the expected behaviour that as Muslims, they are not allowed to smoke in public places, which leads to reduced number of cigarettes being smoked during Ramadan.

The percentage of respondents who stopped smoking during Ramadan in this study was higher in the

intervention group compared with the control group (7.9% vs. 6.6%). As discussed, in general, the smoking reduction in both groups could basically have been due to the influence of the environment. However, a study has shown that smoking bans at home and work are important motivators to smoking cessation.¹⁷ The Ramadan environment provided a perceived social pressure to not smoke (subjective norm) which led to the reduction in the number of cigarettes smoked among most Muslim smokers in both groups and also smoking cessation of some of them. This is in line with the finding that among all the constructs of the TPB (which are subjective norms, attitude, intention and perceived behaviour control); subjective norm has the greatest impact on intention which subsequently influences changes in smoking behaviour.¹¹ The percentage of respondents who stopped smoking during Ramadan in this study was higher (7.9% in the intervention group and 6.6% in the control group) than the self-reported cessation attempts reported in a smoke-free policies intervention study, which was only 2.2%.^{18,19}

The other TPB constructs, such as attitude, could also have had an effect on many of the Muslim smokers who participated in this study as Ramadan is perceived as a spiritual opportunity to do good deeds;¹⁷ thus, smoking cessation in conjunction with Ramadan, could have further increased the positive attitude toward this smoking behaviour change in this study. Supportive subjective norms and a positive attitude, together with perceived strong behaviour

control in Ramadan could have affected the intention towards smoking behaviour during Ramadan in both groups. Although it is not statistically significant, the percentage of smoking cessation during Ramadan was observed to be higher in the intervention group. This observation could be due to the effect of the faith-based intervention. However, due to the limitation in controlling other confounding factors, the cause and effect relationship could not be determined. The intervention was developed using the constructs of TPB of which the main emphasis was to increase intention. This intervention, which took into account both religious and cultural aspects, was expected to further strengthen the individuals' intention to stop smoking among the intervention group. Intentions influence behaviours and are therefore considered the best predictors of smoking behaviour change;¹¹ thus, the smoking cessation was expected to be more successful and sustainable in the intervention group compared to the control. Furthermore, studies have shown that specific interventions which take into account just the cultural aspect (such as language) have better success either through the stages of smoking cessation or smoking cessation itself when compared with a general intervention.^{8,9}

After Ramadan, the mean saliva cotinine levels returned back to their baseline level in both groups, but the increase in the mean saliva cotinine levels in the intervention group was at a slower rate compared to the control group. Thus, comparing the mean saliva cotinine levels between baseline and post-Ramadan in the intervention group still exhibits a significant difference, while comparing the mean saliva cotinine levels between baseline and post-Ramadan in the control group does not. This observation could indicate that there was a slightly better sustainability in the overall reduction in the number of cigarettes smoked among respondents in the intervention group when compared with the control group, despite the intervention group having a significantly higher saliva cotinine level at baseline. Thus, this observation could also be due to the effect of the faith-based intervention received by the intervention group.

Unfortunately, two out of three respondents who stopped smoking during Ramadan resumed smoking after Ramadan. They failed to sustain their non-smoking status. This could be due to the influence of environmental changes. The Ramadan environment facilitates smokers to overcome many smoking cessation barriers such as pro-smoking environments

(e.g. peer influence and acceptability of smoking);⁷ thus, the perceived behaviour control during Ramadan was high. However, after Ramadan, the environment returns back to being pro-smoking. Peers who are smokers return to smoking during the day as this smoking behaviour is religiously and culturally acceptable outside of Ramadan. Smokers who stopped smoking in Ramadan are enticed to smoke again to obtain pleasure from smoking and the smoking environment which they experienced prior to Ramadan.¹⁷ This finding was expected because the major part of the intervention was an opportunistic environment intervention for both groups with an additional religious component in the intervention group.

This intervention can be considered culturally tailored to Muslim smokers. Study results have shown that being a Malay had positive associations with quitting smoking successfully;²⁰ thus, it was postulated in this study that being Muslim would have a similar effect. Unfortunately, no significant findings in relation to a religious component were detected that support the findings of other studies in Malaysia, which have shown that there is a marginal or no significant effect of religious belief as a motivator to quit smoking among Muslim smokers.^{21,22} Furthermore, there are other factors which could have influenced the behaviour of the respondents in the intervention group to a faith-based intervention when compared with the influence of other types of intervention, such as nicotine replacement therapy or other forms of non-religious smoking cessation counselling. These factors were not measured in this study. These include an individual's level of religiosity and cultural norms of the respondents as well as knowledge and perception of the religious ruling (*fatwa*) on smoking. A study has shown that high overall religiosity was related to significantly less smoking and it was also inversely related to current smoking behaviour, although not with past history of smoking.^{23,24} A study conducted of Malay university student smokers found that only 57.4% declared that they knew smoking is "*haram*" (forbidden), while 83.3% were aware that smoking would invalidate their fasting.¹⁵ Another study among Muslim smokers showed that only 6.7% were convinced that smoking is "*haram*" (forbidden).²⁵ These religious rulings in relation to smoking are not enforced in Muslim countries to protect against second-hand smoking or to motivate Muslim smokers to stop smoking.²⁶

In addition, the failure of the respondents who had successfully stopped smoking during Ramadan in the intervention group to maintain their smoke-free status could also be contributed by the fact that as a whole, the intervention group had exhibited significantly higher saliva cotinine levels from the beginning. The higher saliva cotinine levels could indicate that the number of cigarettes smoked per day was higher in the intervention group. A study has shown that fewer number of cigarettes smoked per day predicts a smoker staying quit,²⁷ therefore the prediction for the respondents who quit smoking in the intervention group is lower when compared with the control group, which unfortunately could explain the low sustainability of smoking cessation in the control group. The better performance in the control group could be attributed to the fact that they were younger and had lower cotinine saliva levels. Furthermore, they might have been influenced by other smoking cessation initiatives which were carried out at the national level or locally which were not initiated by this research.

The strength of the study is that it measured cotinine saliva, which is a biochemical marker, to determine the non-smoker status during the study and was not based on mere self-report. The biochemical marker also enabled the quantification of changes in saliva cotinine levels, which is more objective than just changes in the FTND score. The intervention was not expensive since it used behavioural change approaches only, without using any expensive drug replacement regime, such as Nicorette. Thus, the replication of this intervention in another community or target group should not be costly. In clinical settings (either in clinics or hospitals), physicians attending to patients who are smokers just before Ramadan could strongly suggest using the opportunity of the Ramadan environment to start smoking cessation. However, further studies on the challenges and barriers for smokers who have stopped smoking to continue to be smoke-free after Ramadan should be carried out.

One of the limitations of the study was the initial response rate was low in the intervention group and thus there might have been a definite non-response

bias. The reason for refusing to participate in the study among the selected respondents in the intervention group was not known. The follow-up of this study was only up to one month post-Ramadan. The number of respondents lost to follow-up in this study was also quite high, which could pose a serious threat to the research validity. Nevertheless, this rate is similar to other smoking cessation intervention studies, which range between 18 and 23%.^{28,29,30} Lastly, there was an unexpected development of the phenomenal increase in the trend of vaping in Malaysia during the study period. This vaping trend had affected the smoking behaviour of some respondents and thus the results of this study.

CONCLUSION

This study was an attempt to use a culturally competent intervention to encourage smoking cessation for Malay Muslim smokers during Ramadan. Smokers were given practical tips to stop smoking, which were designed specifically to capitalise on the Ramadan environment. Although the saliva cotinine levels decreased significantly in both the intervention and control group during Ramadan, after Ramadan, it remained significant only in the intervention group. Despite the many limitations of this study, this finding could indicate the positive effect of using this culturally competent intervention to encourage smokers to start smoking cessation during Ramadan. However, additional components of the intervention must be developed to help smokers who had stopped smoking during Ramadan from returning to their old habits.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

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