Effect of the motivation program to quit smoking in Royal Thai Air Force officers with non-communicable disease risks

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Abstract

Purpose – The purpose of this paper is to compare the outcome of a smoking cessation program based on the protection motivation theory and a brief intervention among Royal Thai Air Force (RTAF) officers, with non-communicable disease (NCD) risks.

Design/methodology/approach – This quasi-experimental study involved sixty RTAF officers, with NCD risks. The first 30 participants were assigned to a control group and the latter 30 to an experimental group. The control group received brief advice on quitting smoking while the experimental group took part in an eight-week motivational program. The primary outcome was biochemically verified seven-day point prevalence abstinence from smoking. A measurement of carbon monoxide (CO) < 8 ppm in exhaled breath was considered indicative of abstinence.

Findings – Most participants were non-commissioned officers, with an age range of 21–59 years and a mean age of 38.27 years (SD = 10.59). No significant difference in the Fagerström test for nicotine dependence scores between control and experimental groups was observed. The proportion of the participants reporting the seven-day point prevalence abstinence verified by exhaled CO was significantly higher in the experiment group than in the control group (20.0 percent vs 3.3 percent; $p < 0.05$). Numbers of cigarettes per day decreased from 12.87±7.23 and 10.53 ± 7.45 at the baseline to 7.23 ± 5.90 and 8.83 ± 6.13 at the end of study in experimental and control group, respectively.

Originality/value – This motivation-based program to quit smoking had a promising outcome in terms of smoking abstinence and smoking reduction.

Keywords Smoking cessation, Military officers, Motivational programme, Non-communicable diseases

Paper type Research paper

Background

Smoking is one of the primary causes of the four major types of non-communicable disease (NCD): cardiovascular disease, cancer, chronic respiratory disease and diabetes. Smoking is a serious health problem in Thailand with one report stating that Thai people have lost a total of 14.7m disability-adjusted life years (DALYs) on account of the problem[1]. NCDs have become a considerable threat to sustainable development as the loss ratio resulting from NCDs is 71 percent, higher than for communicable diseases (13 percent) and injuries

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(12 percent)[1]. Apart from direct health impacts, smoking has cost the Thai Government health system large amounts of money through the need to provide care facilities and investments for medical treatment, as well as from productivity losses and early death among Thai people. The economic burden from smoking in Thailand is estimated at approximately THB 74.88bn (US$2.18, 95% CI US$2.17 to US$2.19bn), 0.78 percent of the country's GDP, while the tobacco industry only generates 0.50 percent of GDP[2]. Though the number of smokers in Thailand has been decreasing, there still are 10.7m smokers as reported by the Thai National Statistical Office in 2017[3] who surveyed smoking and alcohol consumption among Thai people aged 15 years and older. This number is still high because the target for reducing smoking is only 30 percent[4] with the aim of reaching a prevalence of 15.75 percent or less. This goal is what Thailand has agreed to achieve in the WHO's Global Action Plan for the Prevention and Control of NCDs, 2013–2020, and the five-year National NCD Prevention and Control Strategic and Action Plan (2017–2021)[1].

According to the health information service of the Royal Thai Air Force (RTAF), the smoking prevalence in 2015 was 21.3 percent[5], higher than that of other citizen groups. The RTAF officers' mission is to ensure that the country's air force is able to protect the kingdom as well as to perform all its functions effectively. This goal means that responsible persons need to be physically fit and healthy, and, unless these RTAF officers change their behavior, they are at higher risk of developing NCDs. Increased disease incidence unavoidably affects not only the individual concerned but also their families, and also means that the country has to spend time and money to treat their diseases so they can recover their health.

Encouraging and supporting smokers to quit smoking are effective methods to reduce the death toll and medical expenses caused by tobacco-associated NCDs. Developing and implementing smoking cessation therapies have been set as a primary strategy for preventing and controlling NCDs, following the WHO Framework Convention on Tobacco Control. One program trialed by the RTAF's Division of Preventive Medicine in the Directorate of Medical Services was to build and deploy healthcare teams to provide knowledge and consulting services about smoking cessation to groups of 20–30 people. However, this activity helped only 7.6 percent of smokers to successfully quit smoking. This failure resulted from the fact that the smokers did not build up strong intentions to quit smoking and the period of the smoking cessation program was too short.

Generally, nurses play an essential role in motivating RTAF officers and their families to quit smoking, similar to the important role they provide to the general public. However, an overseas research review claimed that military populations might need interventions that were different from those designed for the general public[6]. The alleged reason is that many military jobs involve life-threatening or environmentally-induced stresses which lead members of the services to seek compensation and distraction by using tobacco. Research conducted in Thailand involving soldiers is available only among enlisted military personnel who are healthy. One example was a quasi-experimental study which was aimed at evaluating the outcome of a smoking cessation program. The study involved 78 enlisted military personnel, applied the stage of change theory and social support, and determined that, within the four-week follow-up period, the average number of cigarettes smoked per day was significantly reduced[7]. Another study was conducted to examine the effectiveness of a six-week smoking cessation program among 104 army conscripts[8]. The results indicated that the smoking cessation rates in the experimental group and the control group were 25.6 (10 out of 39 respondents) and 7.5 percent (3 out of 40 respondents), respectively. A study among young air force conscripts indicated that in the experimental group, enrolled in a smoking cessation program based on a trans-theoretical model, the seven-day point prevalence abstinence rate was significantly higher than that of the control group (29.4 and 5.7 percent, respectively)[9].

Despite the number of studies performed, no clear answers have yet been obtained on the question of whether a smoking cessation program designed for enlisted military personnel would also be effective with military officers for reducing the risk of NCDs. The previously conducted research mainly applied theories to adjust smokers' behavior as well as to provide consulting services for smoking cessation. Certain evidence-based results indicated that the most effective factors motivating the conscripts to quit smoking were the awareness of the benefits of not smoking, the fear of harmful effects caused by smoking[9], and the strength of the motivation and readiness to quit[10]. These factors should be appropriately incorporated when developing a smoking cessation program for military officers.

The efficacy of the protection motivation theory (PMT) in creating a workable smoking cessation strategy is supported by evidence-based practices. The theory involves four basic concepts. The first one is "perceived severity," in which the smoker's fear of harm or negative effects as a result of their behavior is aroused and strengthened. The second concept mentioned is "perceived vulnerability," which focuses on using communication to make people aware of their health threats and to believe that they are at risk. The third concept is "response efficacy," which could be provided by information on how changing their behavior can reduce their risk of developing certain diseases. Finally, "self-efficacy" refers to how an individual perceives their ability to act responsibly in a particular situation[11]. The purpose of this research is to compare the outcome of a PMT-based smoking cessation program and a brief intervention among RTAF officers with NCD risks in terms of successfully quitting smoking.

Methods

This quasi-experimental study was conducted at the Division of Preventive Medicine, Directorate of Medical Service, RTAF, from February to September 2018. The study participants were 60 RTAF officers, who met the following criteria: reported in a health check-up of having at least 1 of the following cardiovascular risks: body mass index$\geqslant$25 kg/m^2, fasting blood sugar $\geqslant$ 100 mg% or blood pressure $\geqslant$ 130/85 mmHg; 20–59 years old; smoking at least one cigarette in the past seven days; and able to communicate via mobile phone. The sample size calculation for a power of 0.80 had an effect size of 0.50 and $\alpha = 0.05$, and an additional 10 percent was added for attrition[12, 13]. The participants were equally divided into two groups with 30 participants in each group, using group matching by age and the number of cigarettes smoked per day in order to control for confounding variables[12, 14].

Ethical consideration

The study proposal was approved by the Ethics Review Committee for Research Involving Human Research Subjects, Health Sciences Group, Chulalongkorn University (COA No. 174.1/60).

Instruments

A demographic data form, developed by the researchers and based on a literature review, was employed. The form consisted of questions regarding personal data and smoking-related characteristics such as the number of cigarettes smoked daily and medical history. The Fagerström test for nicotine dependence (FTND), a six-item questionnaire, was used to assess the severity of nicotine dependence. The FTND is widely used and has shown acceptable psychometric properties. The intraclass correlation coefficient of the Thai version was 0.83 and Cronbach's α was 0.52[15].

The quit smoking questionnaire was self-reported and assessed the participant's smoking status. With permission, an existing survey developed by Hongin and Preechawong[16] was revised to suit the study samples. The instruments were examined by five experts in the area of smoking cessation and instrument development before use for clarity, language appropriateness, and content validity. Since the primary outcome of this

study was the biochemically verified seven-day point prevalence abstinence from smoking, a device designed to measure the amount of exhaled carbon monoxide (CO) in a smoker's breath to verify smoking cessation, called a Smokerlyzer®, was also employed. Exhaled CO at a level of 8–10 parts per million (ppm) is commonly cited as indicative of abstinence[17]. In this study, we used a level of < 8 ppm CO as the abstinence cut-off[18].

The motivation program to quit smoking

The Protection Motivation Program to Quit Smoking was developed based on PMT and the 2016 Tobacco Dependence Treatment Guideline, Thailand[19]. The program provided the participants with three weekly sessions of one-on-one counseling lasting 20–30 min each. In the first session, the participants were made aware of the adverse effects of tobacco and the dangers of continuing to smoke by using exhaled CO measurements from the Smokerlyzer® combined with the results of their health report. The participants were then provided with advice on how to quit smoking by following a mutually agreed upon action plan.

The goal in the second week was to build up an expectation of the positive effects of changing behavior in order to quit smoking and to encourage the subjects to reinforce their capability of quitting smoking by using role models. Well-known RTAF officers who successfully stopped smoking were invited to share experiences and information to encourage the participants to quit smoking. Study participants were organized into groups of ten to spend twenty minutes completing this activity together. Afterwards, they were challenged to follow the suggestions themselves and to make progress toward achieving their personal goal of quitting. CO levels were measured, compared with the previous readings and those who had succeeded in dropping below the 8 ppm cut-off were praised, while the participants who still smoked were encouraged to try quitting again.

The researcher followed up the outcome of the study with the participants via mobile phones in the fourth and sixth weeks.

The third activity (eighth week) was the session in which the researcher met the participants individually to measure their exhaled CO, listen to their experiences and give them advice on how to cope with nicotine withdrawal and other suggestions on how to sustain abstinence.

The first author also served as an intervener. She completed a three-day tobacco cessation provider training course arranged by the Thai Health Professional Alliance against Tobacco in 2017. All participants were handled by the same intervener (Figure 1).

Conventional care

The participants in the control group were given conventional care by the researcher: 5–10 min of brief advice on smoking cessation in the first week and a telephone call follow-up in the fourth week.

Implementation and data collection procedure

Demographic and smoking characteristics of all participants were collected before the program started. Both groups underwent pre-test and post-test evaluations using the perceived severity and susceptibility of the smoking questionnaire as the instrument for experimental monitoring. All participants were followed up by a researcher nine weeks after the initial session, using the quit-smoking questionnaire. Exhaled breath CO was measured and those who had CO > 8 ppm were considered to have failed in quitting smoking.

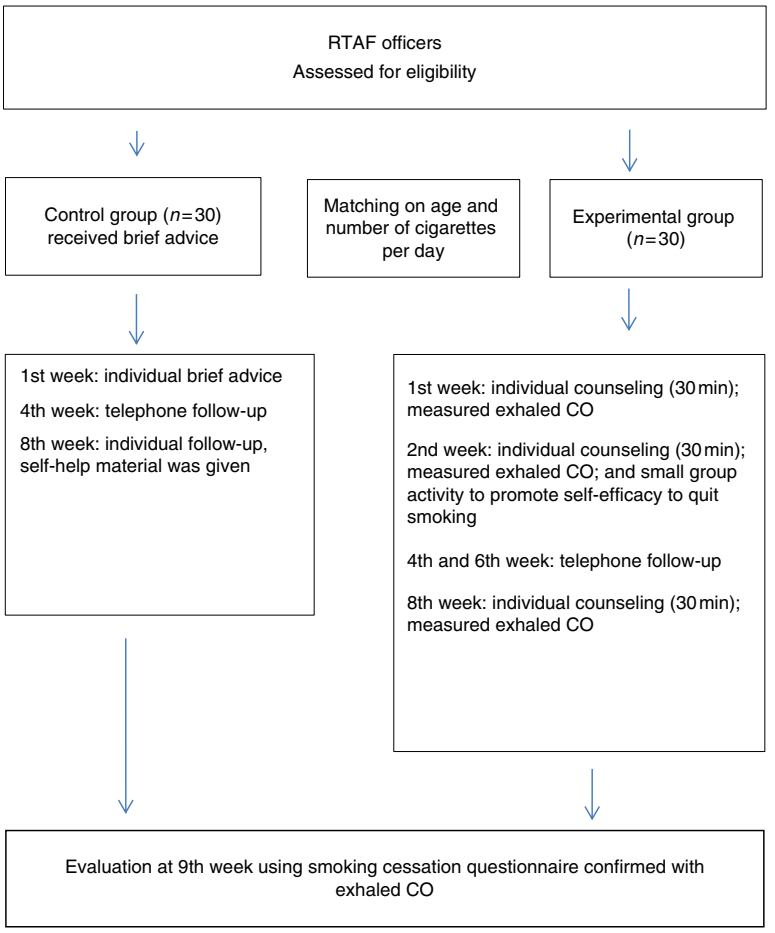

Figure 1.
Scheme of the motivation to quit smoking program

Data analysis

The demographic data and smoking characteristics were analyzed and described with frequency, mean and standard deviation. The *Z*-test and *t*-test were also applied to ascertain whether there was a significant pre-post intervention difference between the groups.

Results

Characteristics of the participants

This study involved 60 Air Force officers at risk of NCDs, 30 in the study group and 30 in the control group. The majority of participants were non-commissioned officers. The age range was 21–59, with a mean age of 38.27 years old (SD = 10.59). Regarding their smoking history, most participants in both groups smoked more than ten cigarettes per day. There was no significant difference in the FTND scores between the experimental group ($\overline{X} = 4.06$, SD = 2.56) and the control group ($\overline{X} = 3.16$, SD = 2.32). About half of the participants indicated that they tried quitting one to two times (Table I).

	Experiment group		Control group		
	n	%	*n*	%	*p*-value
Mean age (SD)	40.67 (10.53)		35.87 (10.28)		0.079[a]
Military ranks					
Non-commissioned officer	24	80.0	24	80.0	1.000[b]
Commissioned officer	6	20.0	6	20.0	
Number of cigarettes smoked a day					
Mean (SD)	12.87 (6.16)		10.53 (7.45)		0.407[a]
Level of nicotine dependence (FTND)					
Mild	14	53.3	18	60.0	0.074[b]
Moderate	9	33.3	11	36.7	
Severe	7	13.4	1	3.3	
Mean (SD)	4.06 (2.56)		3.16 (2.32)		0.159[a]
Quitting history					
Never	9	23.3	5	16.7	0.715[b]
1–2	13	46.7	15	50.0	
$\geqslant 3$	8	30.0	10	33.3	
Blood pressure (mmHg)					
120–129/80–84	9	30.0	15	50.0	0.085[b]
$>$ 130/85	21	70.0	15	50.0	
Fasting blood sugar (mg%)					
Unknown	5	16.7	19	63.3	0.001[b]
70–99	20	66.6	7	23.3	
$\geqslant 100$	5	16.7	4	13.4	
Body mass index (kg/m^2)					
< 25	15	50.0	8	26.7	0.064[b]
$\geqslant 25$	15	50.0	22	73.3	

Notes: [a]Tested via *t*-test; [b]tested via χ^2 test

Table I. Participants characteristics

Comparison of abstinence between both groups

By the end of the study, only 6 participants out of the 30 involved in the Motivation to Quit Smoking Program and one in the control group were able to quit successfully. The percentage of participants who reported the seven-day point prevalence abstinence verified by exhaled CO in the experimental group was significantly higher than in the control group (20.0 percent vs 3.3 percent; $p < 0.05$). Although there was no significant difference between the two groups at the beginning of the study in the baseline average number of cigarettes smoked per day, by the end of the study, the numbers of cigarettes per day had decreased from 12.87 ± 7.23 and 10.53 ± 7.45 at baseline to 7.23 ± 5.90 and 8.83 ± 6.13 in the experimental and control group, respectively. The reduction in the number of cigarettes smoked per day by participants in the experimental group was significantly greater than that of the control group ($p < 0.05$) (Tables II and III).

Discussion

The Motivation to Quit Smoking Program was moderately successful in persuading RTAF officers to stop smoking or at least to reduce the number of cigarettes smoked per day. At the end of the research, the percentage of participants who succeeded in smoking cessation was found to be significantly higher in the experimental group ($p < 0.05$) than in the control group.

The researcher conducted three sessions of individual consulting services with the RTAF officers following their health test reports to facilitate creating a personalized smoking cessation plan. These sessions were designed to raise awareness of the negative effects of smoking including NCD risks and to arouse their fear of harm caused by smoking.

Using RTAF officers who had successfully quit smoking as role models to share experiences and information as well as to inspire the participants to quit smoking was considered effective. Using the Smokerlyzer device to measure the amount of exhaled CO helped participants to see the negative effects of smoking directly and the danger of cigarettes more clearly and was a strong motivator for quitting smoking. This result was consistent with the study of Hongin and Preechawong's[16] in which the application of PMT promoted smoking cessation among orthopedic patients. Our findings clearly showed that the individuals participating in this program were more successful in smoking cessation than the ones in the control group. We found that providing knowledge and motivation was one of the best ways to eliminate the participants' reluctance to quit and give them a crystal clear goal to achieve in their smoking cessation. The outcome of this study was also consistent with that of one conducted among army officers, which showed that the success of the experimental group in smoking cessation was 25.6 percent (10 out of 39 participants), while that of the control group was only 7.5 percent (3 out of 40 participants)[8]. Moreover, the current results are similar to a previous investigation in which RTAF conscripts receiving advice to quit smoking from their pharmacists, reported a seven-day point prevalence abstinence rate after three months of 29.4 percent for the experimental group and only 5.7 percent for the control group[9].

Compared to other studies, our results showed a lower smoking cessation rate, which may be because the participants in our study were middle-aged RTAF officers who had been smoking for a long time, and suffered from a combination of strong ties to social smoking and addiction. Another factor could be our use of the more stringent CO cut-off of 8 ppm rather than the more commonly used 10 ppm.

However, both the experimental group, participating in the protection motivation program to quit smoking, and the control group, receiving only brief advice, had succeeded in reducing the number of cigarettes smoked per day, compared to when they commenced the program. The experimental group reduced the number of cigarettes smoked per day from 12.87 to 7.23, while the control group reduced their cigarettes from 10.53 to 8.83.

Table II.
Seven-day point prevalence abstinence rates between the control and the experimental group at 9 weeks after implementation of the program

	Experiment group n (%)	Control group n (%)	df	Z
Yes	6 (20.00)	1 (3.33)	1	4.043*
No	24 (80.00)	29 (96.67)		

Note: *p-value < 0.05

Table III.
Comparison of the mean differences between the experimental and control groups

Number of cigarettes smoked per day	Experiment group $\overline{X}$ (SD)	Control group $\overline{X}$ (SD)	df	t
Baseline	12.87 (6.16)	10.53 (7.45)	58	−1.32
Follow-up at week 9	7.23 (5.90)	8.83 (6.13)	58	1.03
	$\overline{d}$(SD)	$\overline{d}$(SD)		
Changes in the number of cigarettes smoked per day	5.64 (6.33)	1.70 (4.40)	58	−2.97*

Note: *p-value < 0.01

This observation is similar to that reported in a previous study[9] and suggests that the participants in the control group have a chance to successfully quit smoking in the future should they be followed up and encouraged to do so.

Conclusions and limitations

This motivational program to quit smoking had a promising outcome regarding smoking abstinence and smoking reduction. However, it was rather short with a limited follow-up period of only two months, making its long-term outcome unknown.

Implications and recommendations

Nurses could apply this program to promote smoking cessation among RTAF officers by enhancing their motivation to quit smoking by CO monitoring and other measures, and the same framework could be used with other groups of smokers. Future research studies should adopt the protection motivation program to quit smoking utilized with the RTAF officers, including talks by former smokers who have quit the habit, and there should be provision made for facilities to provide a long-term assessment of abstinence and continuing support by phone or even by social media.

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