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EFFECTS OF COMPULSORY VERSUS VOLUNTARY METHODS FOR YOUTH OFFENDERS IN A PHARMACIST-BASED SMOKING CESSATION PROGRAM

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Abstract: The purpose of this quasi-experimental trial was to compare the effectiveness of a pharmacist-based smoking cessation program for youth offenders between a compulsory and a voluntary method and to determine the predictors of cigarette smoking in youth offenders. The study was conducted at the Juvenile Family Division, Pathumtani Provincial Court, in Thailand. A total of 182 youth offenders who smoked cigarettes regularly in the past six months were enrolled in the study. Participants were assigned to one of the two groups at the judge's discretion. Youth offenders in the study group were ordered to stop smoking by a compulsory method, while those in the control group were advised to stop smoking by a voluntary method. Both groups were included in a pharmacist-based smoking cessation program at the Thanyarak Hospital. The primary outcomes were continuous abstinence rate and 7-day point prevalence abstinence rate at 24 weeks after the quit date, which were confirmed by urine cotinine test. The 7-day point prevalence abstinence rates were significantly higher for the compulsory method compared to the voluntary method at week 16 (28.9% versus 15.2%, p=0.026) through week 24 (35.6% versus 15.2%, p=0.002). Continuous abstinence rates throughout the 24 weeks were not significantly different between the two methods. The number of cigarettes smoked per week in compulsory group was significantly lower than that of the voluntary group at all visits ($p<0.001$). The number of "smokers in friends' group", "age started smoking", and "educational level at senior high school" were significant predictors of cigarette smoking ($R^2=0.24$, p=0.021). A pharmacist-based smoking cessation program with a compulsory method had more success in helping youth offenders to quit smoking, change their stage of readiness to quit, and decrease the number of cigarettes smoked per week.

Keywords: Pharmacist-Based, Smoking Cessation Program, Youth Offenders, Compulsory Method, Voluntary Method

INTRODUCTION

Tobacco smoking remains the leading preventable cause of death and related illness cost billions of dollars each year (World Health Organization, 2015). The global prevalence of tobacco smoking among persons aged 15 years and older was estimated to be 22% in 2012 (World Health Organization, 2014). Smoking prevalence among youths is also seen at a high percentage. In 2015, about one-third of high school students in the United States had tried cigarette smoking, and over 10% of high school students had smoked at least one cigarette in

the past 30 days (Kann et al., 2016). In response to the large number of youth smokers, the United States Preventive Services Task Force (USPSTF) has issued a recommendation for primary care clinicians to provide smoking cessation interventions, including education or brief counseling, in children and adolescents who are classified as smokers (CDC, 2015; Moyer, 2013; USPSTF, 2019). Although nicotine replacement therapy, bupropion, and varenicline have been proven effective in increasing tobacco cessation quit rates in adults, they are not currently recommended as a component of children and adolescents tobacco use interventions and not approved by the U.S. Food and Drug Administration for tobacco cessation in children and adolescents (CDC, 2015; Moyer, 2013; USPSTF, 2019).

Sussman (2002) conducted an exhaustive review of 66 smoking cessation programs among young participants. For the intervention studies that included a control group comparison, the mean abstinence rate across the control groups was approximately 7%, with an overall baseline smoking mean estimated at seven cigarettes per day. Most smoking cessation programs were conducted in the general youth population and used voluntary methods. Many studies did not use compulsory smoking cessation treatments, because smoking was a self-experiment (Gostin, 1991). A compulsory method was often used in youth offenders who were addicted to other illegal drugs (e.g., amphetamine, heroin, marijuana, etc.). In most cases, youth offenders were ordered by the judge to treat their drug-addiction before punishment, but this practice was not applied to cigarette smoking. In recent years, there have not been studies on the effectiveness of a compulsory method in helping youth offenders to quit smoking, and no study has determined the differences between the compulsory and voluntary smoking cessation methods.

Pharmacists consider smoking cessation as an important activity and are interested in providing such counseling (Margolis et al., 2002). In addition, some pharmacy practice laws allow for collaborative practice agreements with physicians, which empower pharmacists to initiate and modify drug therapies for patients, including smoking cessation (Ferro et al., 1998). Dent et al. (2007) conducted a systematic review of literature published between 1980 and 2006 regarding pharmacist-based smoking cessation services. Five studies were randomized controlled trials and 10 were uncontrolled. Results showed that interventions delivered by pharmacists were feasible and effective. In addition, Dent et al. (2009) conducted an open-label, prospective, randomized, controlled trial to assess the effectiveness on smoking cessation in a face-to-face group program conducted by the pharmacist team compared with a brief standard of care session delivered by a pharmacist over the telephone. This study suggested that pharmacists are effective providers of smoking cessation interventions.

While smoking cessation programs are pivotal for smokers to quit smoking, the smoking prevention programs for nonsmokers are also necessary. If we have the predictors to detect smoking behavior in youths, we could use this information to aid in smoking risk assessments. The smoking behavior of the youths' family, friends and others can influence them to initiate smoking, because they believe that cigarette smoking is the norm within their community (Naing et al., 2004; Jackson and Prebble, 2002). A survey study showed that young people who had witnessed smoking scenes had a greater risk to initiate cigarette smoking (Sargent, 2007). Supawongse (1998) explored the tobacco smoking behavior of Thai youths in 16 provinces (N=3404) in 1997. The results indicated that youths who regularly smoked were more likely to have poor educational performance, have low educational levels, and be early school dropouts than those who did not. It was also found that the more income the youth earned, the higher the rate of tobacco smoking was. However, there are no studies on the determinants of the predictors of cigarette smoking.

From the studies mentioned above, we can conclude that pharmacist-based smoking cessation programs for youths have been limited, especially in youth offenders.

MATERIALS AND METHODS

This quasi-experimental, nonequivalent pretest-posttest control group trial was conducted from 2008 to 2011. Participants in this study were youth offenders who committed a crime and were ordered behavior modification at the Juvenile Family Division, Pathumtani Provincial Court. Youth offenders were included if they met the following criteria: committed a crime and were ordered behavior modification, aged between 11-18 years, and smoked cigarettes regularly in the past six months. If they used other forms of tobacco (e.g., snuff, chewing tobacco, cigars, pipes) or other illicit drugs (e.g., amphetamine, ecstasy, heroin, marijuana, etc.), they were excluded from this study. The study protocol was approved by the Human Subjects Research Committee of Thanyarak Hospital. An estimated sample size was calculated from data of a smoking cessation clinic at Thanyarak Hospital, which revealed that 330 voluntary youths had a continuous abstinence rate of 9.69% (N=32). Since there was no data regarding the compulsory method, we assumed that the difference in the continuous abstinence rates between the two groups would be approximately 18%.

All youth offenders who met the criteria were assigned to one of the two groups at the judge's discretion. Youth offenders in the study group were ordered to stop smoking by a compulsory method, while youth offenders in the control group were advised to stop smoking by a voluntary method. Youth offenders in the compulsory method were ordered to stop smoking by a judge and were adjudicated in lieu of imposing restrictions on conduct; however, these youth offenders would face punishment if they were not able to quit smoking. Youth offenders in the voluntary method were advised to stop smoking by a judge and would not face punishment if they were not able to quit smoking. Youth offenders in both groups were included in a pharmacist-based smoking cessation program at the outpatient department of Thanyarak Hospital, Pathumtani, Thailand. There was only one licensed clinical pharmacist (the investigator) responsible for the pharmacist-based smoking cessation program, who provided a face-to-face counseling intervention in this study. After being given both verbal and written descriptions of the study, youth offenders and their parents or guardians were provided with consent forms.

The youth offenders' demographic and smoking history data were recorded in the patient record forms. Then, all youths were interviewed and evaluated for the stages of readiness to quit smoking using the Transtheoretical Model. The nicotine dependence level was determined using the Fagerström Test for Nicotine Dependence, and the reasons why they were still smoking were obtained using the "why are you still smoking?" questionnaire. After they completed all of the documents, the youths were counseled on behavioral modification, social support, the use of sodium nitrate mouthwash, skills to prevent the urge to smoke cigarettes, self-motivation, and setting a target quit date (not more than 14 days after the first visit). Abstinence data at 2, 4, 8, 12, 16, and 24 weeks after the quit date were recorded in a follow-up visit form. All of the follow-up visits were arranged at the Thanyarak Hospital. Similar to the first visit, youth offenders were counseled by the clinical pharmacist at follow-up visits. They were also asked for their smoking status and if problems occurred after quitting smoking, which the pharmacist offered to help them resolve. The primary outcomes were the self-reported continuous abstinence rates (CARs) and the 7-day point prevalence abstinence rates (PARs), which were confirmed by the measurement of urine cotinine. Abstinence rates were calculated as the number of youth offenders who were able to quit smoking divided by the number of all youth offenders for each group.

An intention-to-treat analysis was used in this study. Youths who missed follow-up visits for any reason were considered to have failed to quit smoking. The level of significance was set at alpha 0.05. Descriptive statistics were used to evaluate the baseline characteristics, smoking history and abstinence rates at follow-up periods. Statistical comparisons between

the study and the control group for categorical variables were performed using Chi-square (χ^2) tests or Fisher's exact tests in the analysis of baseline characteristics, 7-day PARs, and CARs at follow-up periods (2, 4, 8, 12, 16, and 24 weeks after the quit date). An independent t-test was used to compare the number of cigarettes smoked per week between the two groups, and a one-way repeated measures analysis of variance (ANOVA) was used to compare the number of cigarettes smoked per week at baseline to the number of cigarettes smoked per week at each follow-up visit for each group. Univariate regression with the level of significance set at alpha 0.25 was performed to determine the association between the number of cigarettes smoked per day (i.e., dependent variable) and independent factors. The associated independent factors were analyzed with a multiple regression analysis and were used to develop an equation by a backward stepwise regression method.

RESULTS AND DISCUSSION

Participants were youth offenders who met the inclusion criteria and were willing to participate in the study. Figure 1 depicts the flow diagram of participant disposition throughout the study.

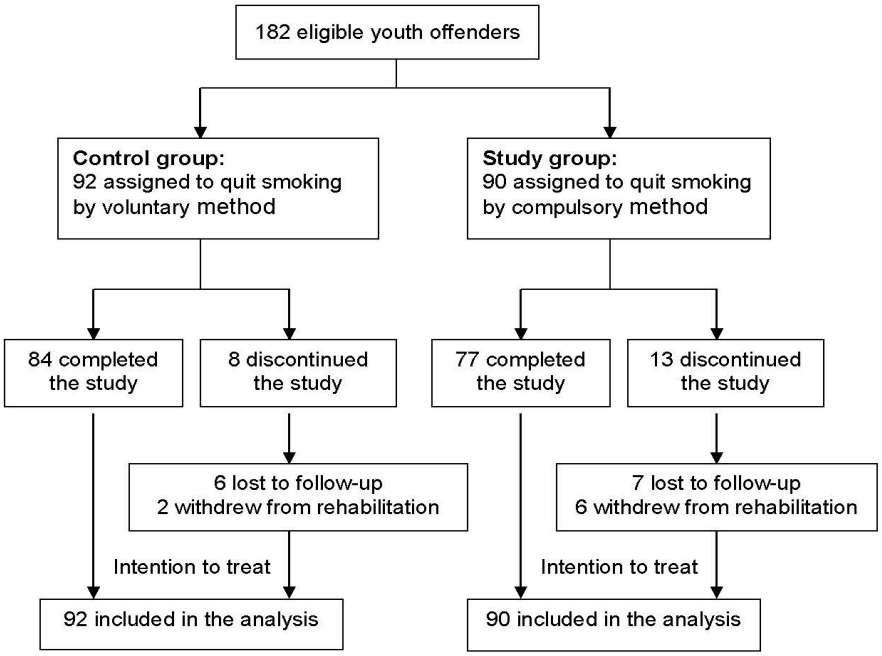


Figure 1. Flow Diagram of the Participant Disposition

Of the 182 youth offenders, 161 completed the 24-week study period (77 from the study group and 84 from the control group). In the study group, seven youths were lost to follow-up and six withdrew from rehabilitation at the Juvenile Observation and Protection Center. In the control group, six youths were lost to follow-up and two withdrew from rehabilitation at the Juvenile Observation and Protection Center.

Table 1. Baseline Characteristics of Youth Offenders.

Characteristics	Voluntary (control group) (N = 92)	Compulsory (Study group) (N = 90)	P- Value
Gender, N (%)			
- Male	90 (97.8)	86 (95.6)	0.441
- Female	2 (2.2)	4 (4.4)	
Age, y mean ± SD (range)	16.87±1.16 (14-18)	16.57±1.16 (14-18)	0.080
Offending case			
- Related to drug addiction	31 (33.7)	34 (37.8)	
- Against property	31 (33.7)	34 (37.8)	
- Related to sexual assault	6 (6.5)	4 (4.4)	0.474
- Related to life/body injury	10 (10.9)	4 (4.4)	
- Related to traffic violation	2 (2.2)	0 (0.0)	
- Related to illegal gun	5 (5.4)	7 (7.8)	
- Related to copyright violation	7 (7.6)	7 (7.8)	
Sentences status			
- Restricted conduct	14 (15.2)	12 (13.3)	
- Restricted conduct and suspension of the determination of punishment	53 (57.6)	48 (53.4)	0.659
- Restricted conduct and infliction of punishment	25 (27.2)	30 (33.3)	
Educational level			
- Primary school	29 (31.5)	23 (25.5)	
- Junior high school	41 (44.6)	51 (56.7)	0.259
- Senior high school	22 (23.9)	16 (17.8)	
Alcohol consumption			
- Never	37 (40.2)	30 (33.3)	0.591
- Occasional	48 (52.2)	51 (56.7)	
- ≥ Once per week	7 (7.6)	9 (10.0)	
Age started smoking, y mean ± SD (range)	14.51 ± 1.75 (7-17)	14.10 ± 1.49 (9-17)	0.90
No. of years smoked mean ± SD (range)	2.43 ± 1.67 (1-11)	2.63 ± 1.51(1-8)	0.402
No. of cigarettes/day in past 6 months mean ± SD (range)	7.42 ± 4.88 (2-20)	7.97 ± 4.35 (2-20)	0.429
No. of previous quit attempts mean ± SD (range)	1.77 ± 1.76 (0-10)	1.57 ± 1.42 (0-6)	0.387
Fagerström Test for Nicotine Dependence score (mean ± SD)	2.77 ± 2.01 (0-9)	2.49 ± 1.43 (1-7)	0.277
No. of smokers in friends' group mean ± SD (range)	6.86 ± 4.19 (0-20)	7.34 ± 4.45 (0-20)	0.449
Stage of readiness to quit			
- Precontemplation	0 (0.0)	29 (32.2)	
- Contemplation	25 (27.2)	27 (30.0)	<0.001*
- Preparation	53 (57.6)	28 (31.1)	
- Action	14 (15.2)	6 (6.7)	

* having a statistically significant difference at α=0.05

Table 1 presents the baseline characteristics and smoking history data, which were not significantly different between the study and control groups (p>0.05), except for the stages of

readiness to quit according to the Transtheoretical Model. Most youths (96.7%) were male with the mean ± SD age of 16.72 ± 1.17 years (ranging from 14 to 18 years). About half of the youth offenders (50.5%) were enrolled in junior high schools. More than half of the youth offenders (63.2%) had previously consumed alcohol. They smoked an average of 7.69 ± 4.62 cigarettes per day, smoked their first cigarette at 14.31 ± 1.67 years of age, and had been smoking daily for 2.53 ± 1.59 years. A 58% had smokers living in their homes. Most youth offenders (97.8%) had friends who smoked, and the mean number of smokers in their social group was 7.10 ± 4.32. Their mean Fagerström Test for Nicotine Dependence (FTND) score was 2.63 ± 1.75, indicating low nicotine dependence. This result was consistent with the scores from the "why are you still smoking?" questionnaire, which showed that psychological and socio-cultural effects were the strongest effects on their smoking dependence rather than the physiological effects of nicotine. The majority (80.8%) had a history of previous attempts to quit smoking.

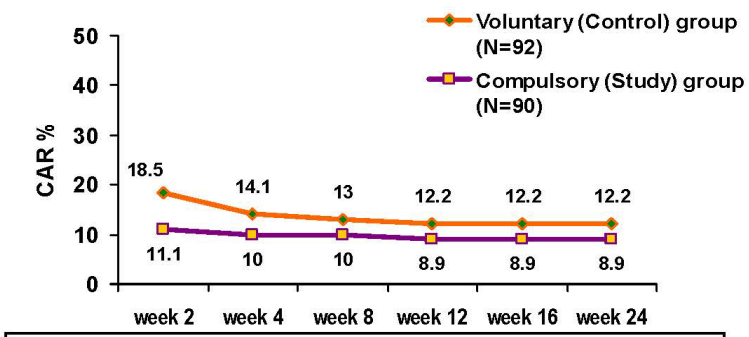
According to the Transtheoretical model (TTM), precontemplation is the stage where smokers do not intend to quit within the next six months. Contemplation is the stage where smokers intend to quit smoking in the next month, but have not tried to quit in the last 12 months. Preparation is the stage where smokers intend to quit in the next month and have tried to quit at least once in the last 12 months, or have made small behavioral changes. Action is the stage where smokers have successfully quit for at least 24 hours, but less than six months. Youth offenders in the study group had stages of readiness to quit that were significantly different from the control group ($p<0.001$).

Table 2. Continuous Abstinence Rates (CAR) and Seven-day Point Prevalence Abstinence Rates (PAR) Between the Two Groups.

Follow-up visits	CAR (%)		*p* value[a]	Odds ratio (95%CI)	PAR (%)		*p* value[a]	Odds ratio (95%CI)
	Control group (N = 92)	Study group (N = 90)			Control group (N = 92)	Study group (N = 90)		
2nd visit (week 2)	17 (18.5)	10 (11.1)	0.162	0.72 (0.43-1.20)	17 (18.5)	10 (11.1)	0.162	0.72 (0.43-1.20)
3rd visit (week 4)	13 (14.1)	9 (10.0)	0.393	0.81 (0.48-1.37)	14 (15.2)	11 (12.2)	0.557	0.87 (0.55-1.40)
4th visit (week 8)	12 (13.0)	9 (10.0)	0.521	0.85 (0.51-1.43)	14 (15.2)	19 (21.1)	0.302	1.21 (0.86-1.69)
5th visit (week 12)	11 (12.2)	8 (8.9)	0.499	0.84 (0.48-1.45)	13 (14.1)	22 (24.4)	0.078	1.36 (0.99-1.85)
6th visit (week 16)	11 (12.2)	8 (8.9)	0.499	0.84 (0.48-1.45)	14 (15.2)	26 (28.9)	0.026*	1.44 (1.08-1.93)
7th visit (week 24)	11 (12.2)	8 (8.9)	0.499	0.84 (0.48-1.45)	14 (15.2)	32 (35.6)	0.002*	0.84 (1.24-2.14)

* having a statistically significant difference at $\alpha=0.05$

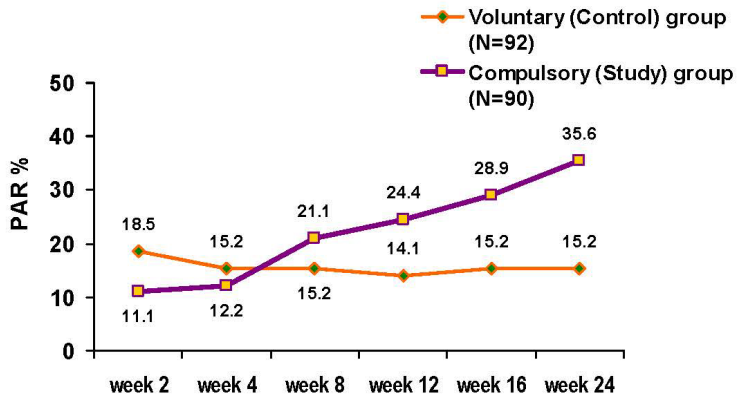
Table 2 presents the continuous abstinence rates (CAR) and the 7-day point prevalence abstinence rates (PAR) in the control and study groups. The CAR at every follow-up visit in the control group was higher than the study group, however, it was not significantly different ($p>0.05$). Figure 2 shows a graphical presentation of the CARs.



	week 2	week 4	week 8	week 12	week 16	week 24
p-value	0.162	0.393	0.521	0.499	0.499	0.499
Odds ratio	0.72	0.81	0.85	0.84	0.84	0.84
(95%CI)	(0.43-1.20)	(0.48-1.37)	(0.51-1.43)	(0.48-1.45)	(0.48-1.45)	(0.48-1.45)

Figure 2. Continuous Abstinence Rates (CAR) in Voluntary Group Compared with Compulsory Group.

There was a significant difference between the 7-day PARs of the control and study groups at weeks 16 and 24 after the quit date. Similar to the CARs, the 7-day PARs at week 2 (18.5%) and week 4 (15.2%) in the control group were higher than the study group (11.1%, 12.2%), but they were not significantly different (p=0.162, p=0.557, respectively). However, at weeks 8 through 24, the PARs of the study group increased at every follow up visit and were higher than the control group. At weeks 8 and 12, the 7-day PARs of the study group were higher than the control group (21.1% and 24.4% vs 15.2% and 14.1%, respectively); however, they were not significantly different (p=0.302, p=0.078, respectively). The 7-day PARs of the study group at week 16 (28.9%) and week 24 (35.6%) were higher than the control group (15.2% in both weeks 16 and 24) and were significantly different (p=0.026, p=0.002, respectively). Figure 3 shows a graphical presentation of the 7-day PARs.



	week 2	week 4	week 8	week 12	week 16	week 24
p-value	0.162	0.557	0.302	0.078	0.026*	0.002*
Odds ratio	0.72	0.87	1.21	1.36	1.44	1.84
(95%CI)	(0.43-1.20)	(0.55-1.40)	(0.86-1.69)	(0.99-1.85)	(1.08-1.93)	(1.24-2.14)

Figure 3. Seven-day Point Prevalence Abstinence Rates (PAR) in Voluntary Group Compared with Compulsory Group.

Figure 4 and Table 3 show the number of cigarettes smoked per week at baseline and each follow-up visit between the control and study groups. The number of cigarettes smoked per week was self-reported by the youth offenders. The number of cigarettes smoked per week significantly decreased from baseline to week 24 in both groups (p<0.001). At baseline, the mean number of cigarettes smoked per week was 55.92 ± 30.24 and 51.97 ± 34.12 in the study and control groups, respectively. At week 24, the mean number of cigarettes smoked

per week was 9.97 ± 13.27 and 27.70 ± 26.34 in the study and control groups, respectively. When compared between the control and study groups, it was found that the mean number of cigarettes smoked per week in the study group was significantly lower than the control group at every follow-up visit (p<0.001).

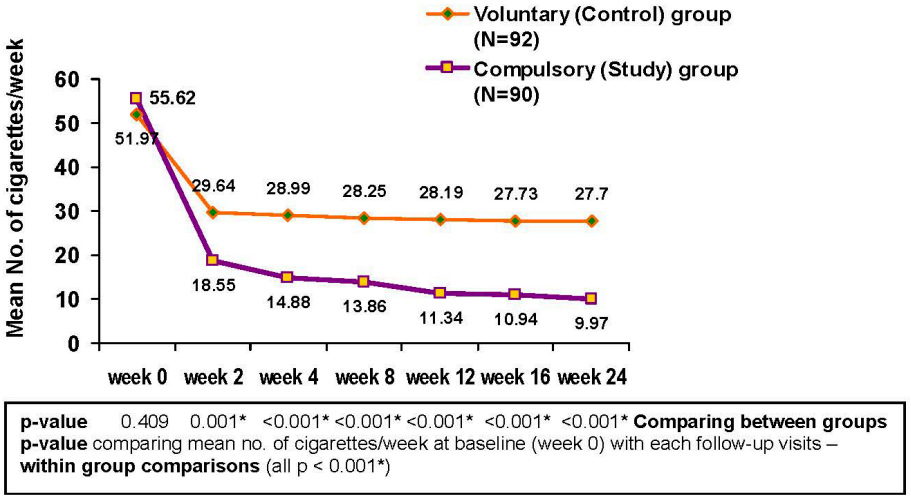


Figure 4. Number of Cigarettes Smoked Per Week Between the Two Groups.

Table 3. Number of Cigarettes Smoked Per Week Between the Two Groups.

Follow-up visits N (control group, Study group)	Number of cigarettes per week Mean ± SD (range)		*p* value[b]
	Control group	Study group	
1st visit (week 0) (N=92,90)	51.97 ± 34.12 (14, 140)	55.92 ± 30.24 (14, 140)	0.409
2nd visit (week 2) (N=88,84)	29.64 ± 25.55 (0, 140)	18.55 ± 16.61 (0, 70)	0.001*
p value[a] (before-after)	<0.001*	<0.001*	
3rd visit (week 4) (N=85,82)	28.99 ± 25.67 (0, 140)	14.88 ± 15.48 (0, 70)	<0.001*
p value[a] (before-after)	<0.001*	<0.001*	
4th visit (week 8) (N=84,80)	28.25 ± 26.15 (0, 140)	13.86 ± 16.37 (0, 70)	<0.001*
p value[a] (before-after)	<0.001*	<0.001*	
5th visit (week 12) (N=84,80)	28.19 ± 27.57 (0, 140)	11.34 ± 13.00 (0, 70)	<0.001*
p value[a] (before-after)	<0.001*	<0.001*	
6th visit (week 16) (N=84,79)	27.73 ± 26.37 (0, 140)	10.94 ± 13.18 (0, 70)	<0.001*
p value[a] (before-after)	<0.001*	<0.001*	
7th visit (week 24) (N=84,77)	27.70 ± 26.34 (0, 140)	9.97 ± 13.27 (0, 70)	<0.001*
p value[a] (before-after)	<0.001*	<0.001*	

* having a statistically significant difference at alpha 0.05

[a] comparing the means number of cigarettes smoked per week at baseline and each follow-up visit within the control and study groups

[b] comparing the means number of cigarettes smoked per week at each visit between the control and study groups

Univariate regression was performed to determine associations between number of cigarettes smoked per day and 13 independent variables as follows: self-factors (eight variables) included gender, age, educational level, daily income or allowance, alcohol consumption, age started smoking, number of years smoked, and a period of watching television per day; parental factors (three variables) included educational level, monthly income, and marital status; and environmental factors (two variables) included number of smokers living at home and number of smokers in friends' group.

Table 4 shows factors and variables associated with number of cigarettes smoked per day when calculated with univariate regression analysis. Categorical variables (e.g., educational level of youth offenders, educational level of parents, and marital status) were translated to dummy variables. The results of this study revealed that factors such as gender, daily income or allowance, alcohol consumption, number of years smoked, a period of watching television per day, marital status of parents, number of smokers living at home, and number of smokers in the youth's group of friends had a positive correlation with the number of cigarettes smoked per day. In contrast, factors such as age, educational level, age started smoking, and monthly income of parents had negative correlation with the number of cigarettes smoked per day.

Table 4. Univariate Regression Analyses Between Each Variable and Number of Cigarettes Smoked Per Day

Factors/Variables	**Correlation coefficient**	**Correlation of determination**	***p*-value**
Self-factors			
Gender	0.068	0.005	0.363
Age	-0.044	0.002	0.557
Educational level		0.047	0.013*
Primary school	constant		
Junior high school	-0.119		0.165
Senior high school	-0.254		0.003
Daily income or allowance	0.122	0.015	0.101*
Alcohol consumption	0.097	0.010	0.191*
Age started smoking	-0.272	0.074	<0.001*
Number of years smoked	0.242	0.058	0.001*
A period of watching television/day	0.152	0.023	0.041*
Parental factors			
Educational level		0.015	0.253
Primary school	constant		
High school	-0.046		0.538
≥Bachelor's degree	-0.118		0.114
Monthly income	-0.167	0.028	0.024*
Marital status		0.013	0.677
Living together	constant		
Separate	0.057		0.470
Father died	0.030		0.707
Mother died	0.106		0.165
Both father and mother died	-0.019		0.798
Environmental factors			
Number of smokers living at home	0.172	0.030	0.020*
Number of smokers in friends' group	0.413	0.170	<0.001*

* having a statistically significant difference at alpha 0.25

We then selected the nine associated independent variables to further analyze with stepwise multiple regression. The backward stepwise regression was used as a method of building the model. Table 5 presents variables associated with the number of cigarettes smoked per day, and Table 6 shows the model summary calculated with multiple regression analysis. It was found that three independent variables, which had a moderate association with number of cigarettes smoked per day (R=0.49) and a statistically significant difference at α=0.05, were: (1) the number of smokers in their group of friends, (2) age started smoking, and (3) a senior high school educational level. These three variables could explain the variance of the number of cigarettes smoked per day by 24% (R2=0.24). The multiple regression equation was as follows:

Number of cigarettes smoked per day = 12.716 + 0.413 (Number of smokers in friends' group) – 0.531 (Age started smoking) – 1.75 (if educational level is at senior high school)

Table 5. Backward Stepwise Multiple Regression Analysis Between Predictors and Number of Cigarettes Smoked Per Day

Predictors	**B**	**Beta**	***p*-value**
(Constant)	12.716		<0.001*
Number of smokers in friends' group	0.413	0.386	<0.001*
Age started smoking	-0.531	-0.188	0.006*
Senior high school	-1.750	-0.155	0.021*

* having a statistically significant difference at alpha 0.05

Table 6. Model Summary Between Factors and Number of Cigarettes Smoked Per Day

Model Summary	
R	0.490
R^2	0.240
adj R^2	0.227
R^2 change	0.023
F change	5.384
***p*-value**	0.021*

* having a statistically significant difference at alpha 0.05

The national data on Thai youth offenders in 2008 revealed that most were male (90.96%), aged between 15-18 years were 84.50% (range 7-18), most had a junior high school level of education (39.27%), and most of them lived with their parents (47.91%) (Department of Juvenile Observation and Protection, 2008). These data are similar to the demographic characteristics of youth offenders in this study. Therefore, we believe that our results are at least representative of Thai youth offenders.

The CARs at every follow-up visit were higher in the voluntary group than the compulsory group, but there was no significant difference between the two methods (p>0.05). Youth offenders in the compulsory method group did not quit smoking instantly, but they gradually decreased their number of cigarettes smoked and some were able to stop smoking after the quit date. Seven-day PARs at 2, 4, 8, and 12 weeks were not significantly different between the compulsory and the voluntary method. However, 7-day PARs at 16 and 24 weeks in the compulsory method group were significantly higher than the voluntary method (p=0.026 and p=0.002, respectively). At the end of program (week 24), the 7-day PAR in the

compulsory group was 35.6% whereas in the voluntary group was 15.2%. We predict that interventions in a pharmacist-based smoking cessation program have a positive effect on smoking cessation in youth offenders.

One of the confounding variables for abstinence rates in this study was the stages of readiness to quit based on the Transtheoretical Model. Most youth offenders (72.8%) in the control group were in the preparation and action stages according to the Transtheoretical Model. They could promptly quit smoking when the investigator set the target quit date for them. In contrast, most youths in the study group were in the precontemplation (32.2%) and contemplation (30.0%) stages, and it was more difficult to counsel them to quit smoking within one to two weeks after the first follow-up visit. Due to the differences in stages of readiness to quit, the continuous abstinence rates in the study group were lower than the control group. Strategies for working with smokers who are not ready to quit include: increasing the smokers' awareness of the available treatment options, having them identify their reasons for smoking and wanting to quit, identifying barriers to quitting smoking, and using the "5 R's" strategy, such as encouraging them to think about why quitting is important to them (Wongwiwatthananukit, 2007).

Counseling could also include discussing the risks of routine smoking to their health, as well as the benefits of quitting, such as better health, improved quality of life, acuity of taste and smell, and saving money. If we could establish a future smoking cessation program, we would schedule more follow-up visits during the initial period to motivate youths, who were not ready to quit, to increase their willingness to quit smoking before setting the target quit date. In addition, youth offenders in the study group who were in the precontemplation and contemplation stages were able to quit smoking after eight weeks, whereas those in the control group and in the contemplation stage, could not. This shows the compulsory method was able to influence youth offenders who were not ready to quit, because they might have been afraid of the punishment that would occur if they continued to smoke. Furthermore, youth offenders who quit smoking in a pharmacist-based smoking cessation program may further motivate other youths, who were not originally ready to quit, by changing their readiness to quit from precontemplation and contemplation stages to preparation and action stages.

When comparing abstinence rates between this study and the previous studies, it was found that the abstinence rates of this study were similar to other studies. The continuous abstinence rate and point prevalence abstinence rate of the study group in this study were 8.9% and 35.6%, respectively. Sussman (2002) reviewed 48 smoking cessation intervention studies and found that an overall continuous abstinence rate at the time of follow-up had a mean of 11.5% (ranging from 0 to 41%). Hurt et al. (2000) conducted an open-label, uncontrolled study in 101 youths using nicotine patches and found that the continuous abstinence rate at six months was 5%. Killen et al. (2004) found that the continuous abstinence rate at six months for nicotine patch plus bupropion (N=103) was 8% and nicotine patch only (N=108) was 7%. For the point prevalence abstinence rate, Moolchan et al. (2005) determined the efficacy of the nicotine patch and gum for voluntary adolescents, and found that the point prevalence abstinence rate at six months in the nicotine patch group (N=34) was 20.6%. From the data above, we can conclude that the compulsory method in this study had an efficacy that is the same or higher than the previous studies. However, if the judges apply this method to force youth offenders to stop smoking in the future, they should set a regulation regarding the punishment when youth offenders fail to stop smoking or do not attend follow-up visits during the smoking cessation program. The added fear of punishment may increase abstinence rates in youth offenders.

The number of cigarettes smoked per week was significantly decreased from baseline throughout the 24 weeks in both groups. When compared between the two groups, it was

found that the mean number of cigarettes smoked per week in the compulsory group was significantly lower than the voluntary group at every follow-up visit. It seemed that the compulsory method had more of an effect on helping youth offenders decrease the number of cigarettes smoked per week than the voluntary method.

For future smoking cessation programs, one should consider if the youth has many friends who are smokers, started smoking at a young age, and has an educational level less than senior high school. Homsin et al. (2009) found that peer smoking was a strong predictor of smoking status of youth. Similarly, a study by Tyas and Pederson (1998) found that youth smoking was associated with peer smoking. In addition, Bauman and Fisher (1986) suggested that the smoking behavior of friends was strongly correlated with youth smoking behavior. A study by Everett et al. (1999) looked at age started smoking, which found that initiating smoking at a younger age was associated with smoking more cigarettes per day than initiation at an older age. In addition, the age when youths started smoking had a positive correlation with smoking cessation rate. Breslau and Peterson (1996) suggested that the likelihood of smoking cessation rate was greater in smokers who had begun cigarette smoking after age 13 than in those who had begun earlier. The impact of the educational level of youth offenders was consistent with the study by Wagenknecht et al. (1990), which suggested that the relationship between education and cigarette smoking patterns had a strong negative correlation. In addition, smoking prevention in youths should start within their family and at a primary school level, such as teaching them about the dangers of smoking and creating positive role models for them. Having many friends who smoke was a main factor associated with a higher number of cigarettes smoked per day, so controlling this factor should be the foundation of a "No smoking" campaign across all schools, in addition to considering a harsher penalty for cigarette sellers who sell to youths under 18 years of age, such as revoking their permit to sell cigarettes.

Study Limitations

This study has several limitations. First, although, abstinence rates in the compulsory group were higher than the voluntary group, the small sample size resulted in a power that was not adequate to detect a statistically significant difference between the compulsory and the voluntary method. Second, we did not have any follow-up visits after 24 weeks, so we do not know if youth offenders returned to smoking after completing the pharmacist-based smoking cessation program. Finally, this study was not randomized and the stages of readiness to quit using the Transtheoretical Model at baseline were significantly different between the two methods. Because one-third of youth offenders in the compulsory group were not willing to quit smoking at baseline, it was more difficult to motivate them to try to quit than those in the voluntary group.

CONCLUSION

A pharmacist-based smoking cessation program with a compulsory method had more success in helping youth offenders to quit smoking, change the stages of readiness to quit, and decrease the number of cigarettes smoked per week. We suggest that interventions in a pharmacist-based smoking cessation program have a positive effect on youth offenders' ability to stop smoking. If we want youth offenders stop smoking in the future, a pharmacist-based smoking cessation program with a compulsory method may be a good place to start.

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