การพัฒนาและประเมินผลโปรแกรมการเลิกบุหรี่โดยเภสัชกร สำหรับเยาวชนที่กระทำความผิด

นายสุภกิจ ดำรงค์พิวัฒน์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาเภสัชศาสตรมหาบัณฑิต
สาขาวิชาเภสัชกรรมคลินิก ภาควิชาเภสัชกรรมปฏิบัติ
คณะเภสัชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2552

DEVELOPMENT AND EVALUATION OF PHARMACIST-BASED SMOKING CESSATION PROGRAM FOR YOUTH OFFENDERS

Mr. Supakit Dumrongpiwat

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Pharmacy Program in Clinical Pharmacy

Department of Pharmacy Practice
Faculty of Pharmaceutical Sciences
Chulalongkorn University

Academic Year 2009

Thesis Title	DEVELOPMENT AND EVALUATION OF PHARMACIST-BASED SMOKING CESSATION PROGRAM FOR YOUTH OFFENDERS
By	Mr.Supakit Dumrongpiwat
Field of Study	Clinical Pharmacy
Advisor	Associate Professor Sarinee Krittiyanunt
Co-Advisor	Associate Professor Supakit Wongwiwatthananukit

Accepted by the Faculty of Pharmaceutical Sciences, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

Pornpen Pramyothi
.....Dean of the Faculty of Pharmaceutical Sciences
(Associate Professor Pornpen Pramyothin)

THESIS COMMITTEE

Narat Kasettratat
.....Chairman
(Assistant Professor Narat Kasettratat)

Sarinee Krittiya S.
..... Thesis Advisor
(Associate Professor Sarinee Krittiyanunt)

R. Dhumma-upakorn
.....Examiner
(Associate Professor Rawadee Dhumma-upakorn)

.....External Examiner
(Mr.Munee Khlaisang)

Somporn Suwanmajo.
.....External Examiner
(Mrs.Somporn Suwanmajo)

สุภกิจ คำรงค์พิวัฒน์: การพัฒนาและประเมินผลโปรแกรมการเลิกบุหรี่โดยเภสัชกรสำหรับเยาวชนที่กระทำความผิด (DEVELOPMENT AND EVALUATION OF PHARMACIST-BASED SMOKING CESSATION PROGRAM FOR YOUTH OFFENDERS) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ.สาริณีย์ กฤติยานันต์, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: รศ.ดร.สุภกิจ วงศ์วิวัฒนกุกิจ, 139 หน้า.

ที่มา: โปรแกรมการเลิกบุหรี่สำหรับเยาวชนในปัจจุบันมีจำนวนค่อนข้างจำกัด โดยเฉพาะอย่างยิ่งในกลุ่มเยาวชนที่กระทำความผิดซึ่งมีพฤติกรรมสูบบุหรี่ค่อนข้างมาก

วัตถุประสงค์: เพื่อประเมินประสิทธิภาพของโปรแกรมการเลิกบุหรี่โดยเภสัชกรสำหรับเยาวชนที่กระทำความผิดระหว่างกลุ่มที่ถูกบังคับและกลุ่มที่สมัครใจเลิกบุหรี่ ในด้าน (1) อัตราการเลิกบุหรี่ (2) คุณภาพชีวิต และ (3) ความรู้ทั่วไปเกี่ยวกับบุหรี่ รวมทั้งศึกษาปัจจัยที่เกี่ยวข้องกับจำนวนบุหรี่ที่สูบต่อวันของเยาวชนที่กระทำความผิด และต้นทุนของโปรแกรมการเลิกบุหรี่โดยเภสัชกร

วิธีดำเนินการวิจัย: การวิจัยกึ่งทดลองรูปแบบเปรียบเทียบกลุ่มที่ไม่เท่าเทียมกัน โดยวัดสองครั้ง เก็บข้อมูลระหว่างวันที่ 1 มกราคม พ.ศ.2551 ถึง 15 มีนาคม พ.ศ.2552 ณ ศาลจังหวัดปทุมธานี แผนกคดีเยาวชนและครอบครัว และสถาบันธัญญารักษ์ คัดเลือกเยาวชนที่กระทำความผิดจำนวน 182 คนเข้ากลุ่มบังคับและสมัครใจโดยแบบสะดวกขึ้นกับดุลยพินิจของผู้พิพากษา เยาวชนทุกคนเข้าร่วมโปรแกรมการเลิกบุหรี่โดยเภสัชกร ณ สถาบันธัญญารักษ์จำนวน 7 ครั้งหลังจากวันกำหนดเลิกบุหรี่ (สัปดาห์ที่ 0, 2, 4, 8, 12, 16 และ 24) **ผลลัพธ์หลักคือ** อัตราการเลิกบุหรี่อย่างต่อเนื่องและอัตราการเลิกบุหรี่ตลอด 1 สัปดาห์ โดยประเมินผลจากแบบบันทึกการเลิกบุหรี่ด้วยตนเองและการตรวจหาโคตินินในปัสสาวะ วิเคราะห์ข้อมูลแบบเจตนาปฏิบัติ ใช้สถิติ chi-square test, t-test, ANOVA และ multiple regression กำหนดระดับนัยสำคัญทางสถิติที่ 0.05

ผลการวิจัย: ข้อมูลทั่วไปของเยาวชนทั้ง 2 กลุ่มไม่มีความแตกต่างกัน ($p>0.05$) ยกเว้นระดับความต้องการเลิกบุหรี่ตาม Transtheoretical Model เยาวชนกลุ่มบังคับมีความต้องการเลิกบุหรี่อยู่ในระดับ precontemplation ร้อยละ 32.2 ในขณะที่กลุ่มสมัครใจไม่มีผู้ใดอยู่ในระดับนี้เลย อัตราการเลิกบุหรี่ตลอด 1 สัปดาห์เมื่อติดตามผลที่ 24 สัปดาห์ในกลุ่มบังคับและสมัครใจเท่ากับร้อยละ 35.6 และ 15.2 ตามลำดับ ($p=0.002$) แต่อัตราการเลิกบุหรี่อย่างต่อเนื่องทุกระยะที่ติดตามผลในกลุ่มบังคับและสมัครใจไม่มีความแตกต่างกัน ($p>0.05$) เยาวชนกลุ่มบังคับสูบบุหรี่ต่อสัปดาห์น้อยกว่ากลุ่มสมัครใจอย่างมีนัยสำคัญทางสถิติทุกระยะที่ติดตามผล ($p<0.001$) คะแนนรวมของคุณภาพชีวิตและความรู้ทั่วไปเกี่ยวกับบุหรี่ดีขึ้นในทุกระยะเวลาที่ติดตามผล แต่ไม่แตกต่างกันระหว่าง 2 กลุ่ม การวิเคราะห์การถดถอยแบบหลายตัวแปร พบว่า จำนวนเพื่อนที่สูบบุหรี่ในกลุ่ม อายุที่เริ่มสูบบุหรี่ และระดับการศึกษาในชั้นมัธยมศึกษา มีความเกี่ยวข้องปานกลางกับจำนวนบุหรี่ที่สูบต่อวัน ($R^2=0.24$) ต้นทุนเฉลี่ยของโปรแกรมการเลิกบุหรี่โดยเภสัชกร/คน/ครั้งอยู่ระหว่าง 24.74 – 105.04 บาท

สรุปผลการวิจัย: อัตราการเลิกบุหรี่ตลอด 1 สัปดาห์ในกลุ่มบังคับสูงกว่ากลุ่มสมัครใจอย่างมีนัยสำคัญทางสถิติ แสดงว่าวิธีบังคับในโปรแกรมการเลิกบุหรี่โดยเภสัชกรมีผลทำให้เยาวชนที่กระทำความผิดซึ่งยังไม่พร้อมที่จะเลิกบุหรี่ เปลี่ยนระดับความต้องการเลิกบุหรี่จากระดับ precontemplation และ contemplation เป็นระดับ preparation และ action

ภาควิชา.....เภสัชกรรมปฏิบัติ.....ลายมือชื่อนิสิต.....สุภกิจ คำรงค์พิวัฒน์.....

สาขาวิชา.....เภสัชกรรมคลินิก.....ลายมือชื่ออ.ที่ปรึกษาวิทยานิพนธ์หลัก.....

ปีการศึกษา.....2552.....ลายมือชื่ออ.ที่ปรึกษาวิทยานิพนธ์ร่วม.....

#4976604633 : MAJOR CLINICAL PHARMACY
KEY WORDS : PHARMACIST - BASED SMOKING CESSATION PROGRAM/ YOUTH OFFENDERS/ COMPULSORY METHOD/

SUPAKIT DUMRONGPIWAT : DEVELOPMENT AND EVALUATION OF PHARMACIST-BASED SMOKING CESSATION PROGRAM FOR YOUTH OFFENDERS. ADVISOR : ASSOC. PROF. SARINEE KRITTIYANUNT, M.Sc., CO-ADVISOR : ASSOC. PROF. SUPAKIT WONGWIWATTHANANUKIT, Pharm.D., Ph.D., 139 pp.

Background: Current smoking cessation program for youths has been limited, especially in youth offenders whose smoking behavior was quite high.

Objectives: To evaluate the effectiveness of a pharmacist-based smoking cessation program for youth offenders between compulsory and voluntary methods in terms of: (1) abstinence rate, (2) health related quality of life, and (3) general knowledge of cigarette smoking. In addition, this study was designed to determine the factors associated with the number of cigarettes smoked per day in youth offenders and to analyse the costs of a pharmacist-based smoking cessation program.

Methods: A quasi-experimental, nonequivalent pretest-posttest control group trial was conducted from January 1, 2008 to March 15, 2009 at the Juvenile and Family Section, Pathumtani Provincial Court and Thanyarak Institute. One hundred and eighty two youth offenders were purposely assigned into compulsory and voluntary methods by judge's discretion. All of them attended the pharmacist-based smoking cessation program at Thanyarak institute for 7 times after the quit date (weeks 0, 2, 4, 8, 12, 16, and 24). The primary outcomes were self-report of continuous abstinence rate and the 7-day point prevalence abstinence rate, evaluated from self report of smoking cessation and urine cotinine test. Data were analyzed using intention to treat analysis, chi-square test, t-test, ANOVA, and multiple regression with a significant level of 0.05.

Results: Baseline characteristics were not different between compulsory and voluntary methods ($p>0.05$), except the stages of change in Transtheoretical Model. Youth offenders in compulsory group had the stage of change in precontemplation 32.2%, whereas none of the voluntary group were in precontemplation stage. Seven-day point prevalence abstinence rate at week 24 of follow up in compulsory and voluntary methods were 35.6% and 15.2%, respectively ($p=0.002$). However, continuous abstinence rates were not significantly different between 2 methods in every follow-up ($p>0.05$). A mean number of cigarettes smoked per week in compulsory group was significantly lower than the voluntary group in every follow-up ($p<0.001$). Total scores of quality of life and general knowledge of cigarette smoking in all follow-ups were higher than baseline but not significantly different between 2 groups. Multiple regression revealed that number of smokers in friends' group, age started smoking, and educational level at senior high school had moderate association with number of cigarettes smoked per day ($R^2=0.24$). The mean costs of a pharmacist-based smoking cessation program/person/visit were between 24.74 – 105.04 baht.

Conclusions: Seven-day point prevalence abstinence rate in compulsory method was significantly higher than voluntary method. It showed that compulsory method in pharmacist based smoking cessation program may influence youth offenders who were not ready to quit, to change the readiness to quit from precontemplation and contemplation stages to preparation and action stages.

Department :....Pharmacy Practice.....Student's Signature:.....Supakit Dumrongpiwat.....

Field of study :..Clinical Pharmacy...Advisor's Signature:.....Sarinee Krittiyanunt.....

Academic Year :.....2009.....Co-Advisor's Signature:.....Supakit Wongwiwatthananukit.....

ACKNOWLEDGEMENTS

I would like to express my respectful thanks to Chulalongkorn University graduate scholarship to commemorate the 72nd anniversary of His Majesty King Bhumibol Adulyadej, and the research fund from Faculty of Pharmaceutical Sciences, Chulalongkorn University.

I would like to extend most sincere thanks and deep gratitude to my thesis advisor, Associate Professor Sarinee Krittiyanunt and my co-advisor, Associate Professor Dr.Supakit Wongwiwatthananukit for their comments, suggestions and advice.

Special thanks to all the members of my thesis committee, for their valuable comments and enlightening discussions.

Sincere thanks to all career judges, lay judges, and every authorities at The Pathumtani Provincial Court (Juvenile and Family Section) for their kindly and helpful cooperation.

In addition, I wish to express my deep appreciation to all physicians, pharmacists, nurses, ethic committee, registration staffs, laboratory staffs and all members of the Matrix centre at Thanyarak Institute for allowing and facilitating me to collect data.

I would like to express my gratitude to all youth offenders who participated in this study and all of those whose name have not been mentioned for helping me in this study.

My sincere gratitude goes to all graduate classmates of 2006, Department of Pharmacy Practice, Faculty of Pharmaceutical Sciences, Chulalongkorn University and all of my friends who have been giving me support and valuable assistance throughout my research.

Finally, this research would not have been successful without endless love, care, and support from my parents and my brother. A number of individuals who contributed towards much of this work. I would like to take this opportunity to thank for your contribution

CONTENTS

PAGE

PAGE

LIST OF TABLES

TABLE **PAGE**

LIST OF FIGURES

LIST OF ABBREVIATIONS

1-β	Power of a test
95% CI	95% confidence interval
χ^2	Chi-square
AHRQ	Agency for Healthcare Research and Quality
ANOVA	Analysis of variance
CA	Continuous abstinence
CAR	Continuous abstinence rate
cpd	Cigarettes per day
e.g.	Exempli gratia (Example)
etc.	Et cetera (and so on)
FDA	Food and Drug Administration
FTND	Fagerstrom Test for Nicotine Dependence
GABA	Gamma aminobutyric acid
gr.	Group
HRQOL	Health-related quality of life
KR-20	Kuder-Richardson 20 formula
i.e.	Id est (That is)
mg	Milligram
ml	Millilitre
MNWS	Minnesota Nicotine Withdrawal Scale
N	Number of samples
ng	Nanogram
No.	Number
NRT	Nicotine replacement therapy
NTM	Nicotine transdermal system
OR	Odds ratio
PA	Point prevalence abstinence
PAR	Point prevalence abstinence rate
PAS	Pharmacists' Action on Smoking
pH	Percent of Hydrogen ion

QSU-Brief	Brief Questionnaire of Smoking Urges
R	Correlation coefficient
R^2	Coefficient of determination
RCT	Randomized controlled trial
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
TSCHRQOL	Thai Smoking Cessation Health-related quality of life
TTM	Transtheoretical model
USA	United States of America
WHO	The World Health Organization

CHAPTER I

INTRODUCTION

Background information

Tobacco smoking is recognized as a contributing factor to a number of acute and chronic diseases e.g., coronary heart disease, chronic obstructive pulmonary disease, emphysema and multiple types of cancers [1]. It is the chief preventable cause of morbidity, with enormous economic costs for the individual smoker and for society, in general [1, 2]. There were about 1,100 million smokers worldwide in 2003 and may increase to 1,600 million by 2015 [2]. The World Health Organization (WHO) reported that this habit globally kills more than 5 million people annually and is estimated to be > 8 million deaths per year by 2030 [3].

A survey carried out by the National Statistical Office of Thailand on smoking behavior during 1991-2006 found that a number of Thai smokers decreased from 11.67 millions to 9.54 millions. In Bangkok, a number of smokers decreased from 32.33% to 13.9% [4]. The declining statistics results from tobacco control and prevention policy which was implemented twenty years ago. However, the incidence of new smokers, especially in the young population, has surprisingly increased in recent years. In 2008, the theme of the world no tobacco day “Tobacco Free Youth” was expanded to prevent the youths from becoming regular smokers and to reduce tobacco-related death and diseases [5]. Among youths aged less than 19 years old, 375,000 of them were smoking addicted and 78,000 were regular smokers. This figure is a serious problem facing society today [6]. Youth offenders who committed a crime and were judged to punish at the Juvenile Observation and Protection Center had higher smoking behavior than other youth groups, about 95.9% of youth offenders were regular smokers [7]. The global youth tobacco survey in Thailand issued that 16.9% of youths smoked their first cigarette at age less than 10 years old [8]. The younger the child starts smoking, the stronger the odds of being the long-term tobacco dependence in adulthood [9, 10].

Nicotine dependence is a major reason for failure to smoking cessation in most smokers. It was reported that about 70% of smokers addict to the nicotine [11]. Despite numerous attempts to inform people of smoking dangerous, the rates of tobacco cessation remain very low. Many new smokers, especially young people, are

added to the ranks of persistent smokers each day. Smokers who try to quit using will power (i.e., cold turkey) alone have about 5-7% long-term success. If they receive the brief advice from clinician, the abstinence rate will increase to 10%. Furthermore, if they attain the intensive cessation program with behavioral counseling, and/or pharmacotherapy, the long-term abstinence rates are approximately double or even triple the rates of successful quitting relative to placebo, which is generally less than 30%. Finally, if they receive pharmacotherapy and behavioral counseling, the long-term success rate would increase to 30-40% [12]. In 2008, the U.S. Public Health Service published an updated clinical practice guideline for treating tobacco use and dependence, which presents evidence-based recommendations and effective strategies for clinician-facilitated tobacco cessation counseling. Although even brief advice from a clinician is associated with increased odds of quitting, more intensive counseling (longer and more frequent counseling sessions, or greater overall contact time) and use of pharmacotherapy results in increased abstinence rates. The guideline strongly emphasized that health care professionals e.g., physicians, dentists, nurses or pharmacists should routinely advise smokers to quit smoking for every visit [13].

Dent et al. conducted a systematic review of literature published between 1980 and 2006 regarding pharmacist-based smoking cessation services. There were five randomized controlled trials and all of them used voluntary subjects [14] as followed: (1) Howard-Pitney et al. evaluated the effects of a nicotine transdermal system (NTS) versus placebo in people who used chewing-tobacco and had desire to quit (N=410). All participants received behavioral counseling including two pharmacy visits, two support calls, and self help materials. At the end of 6 months, the 7-day point prevalence abstinence rate was not significantly different between two groups: 38% for the treatment group and 34% for the control group. However, the high abstinence rate of the placebo group suggested a strong effect attributed to pharmacist counseling [15]. (2) Maguire et al. evaluated the effectiveness of pharmacists' action on smoking (PAS) program (N=265) compared with ad hoc advice from pharmacists (N=259). Participants were aged between 17 and 72 years. The PAS program consisted of leaflet, individual counseling and follow up advice. At the end of 12 months, the continuous abstinence rate was 14.3% in the PAS group and 2.7% in ad hoc group ($p<0.001$) [16]. (3) Vial et al. conducted a study to compare the abstinence rates of a pharmacist-based smoking cessation program, which was initiated in an inpatient

hospital, the community pharmacy, or hospital outpatient setting. Of the 102 smokers, 35 were randomly assigned to the hospital pharmacist arm, 34 to the community pharmacist arm, and 33 to the control arm. All patients attended an initial 30-45 minute consultation with the hospital pharmacist, then appointments were made with either the hospital pharmacist or community pharmacist for the following weeks. At the end of 12 months, the 30-day point prevalence abstinence rates were 22.9%, 14.7%, and 3% for hospital inpatient arm, community arm, and control arm, respectively (p=0.031) [17]. (4) Sonderskov et al. conducted a study to assess the abstinence rates among individuals who used over-the-counter NTS compared with a placebo patch. Mean age of participants was 38.2 $\pm$ 12.9 years old. At the end of 6 months, the 30-day point prevalence abstinence rate in light smokers (>10 cigarettes per day (cpd) but < 20 cpd) was 23% for the treatment group (N=119) and 18% for the placebo group (N=125), (p=NS). For heavy smokers who smoked > 20 cpd, the 30-day point prevalence abstinence rate was 11% for the treatment group (N=136) and 4% for the placebo group (N=142), ($p<0.05$) [18]. (5) Carroll et al. conducted a study to determine the abstinence rates of participants who received smoking cessation counseling from the trained pharmacy personnel (N=224) compared with the abstinence rates for smokers who received only standard pharmacy support (N= 268). All participants were aged between 17-77 years old (mean age = 41.6 $\pm$ 10.5). Smokers in the treatment group received the pharmacy support program, which included registration, counseling, and documentation of the participant's progress. Smokers in the control group received standard professional support. At the end of 9 months, the continuous abstinence rate was 11.6% for the treatment group and 7.1% for the control group (p=0.089) [19]. Recently, there was a randomized trial assessing the effectiveness of a pharmacist-delivered program for smoking cessation which showed the benefit outcome of pharmacist intervention. Hence, participation of pharmacists in smoking cessation programs/services could have a significant impact on smoking prevalence, prevention of tobacco-related illness, and improvement in the public health.

It is well known that smoking behavior is a complex interplay of psychological, socio-cultural, and nicotine factors [12, 20-22]. From this perspective, smokers would have experienced nicotine withdrawal symptoms and psycho-social changes during the quitting process and adversely affected the functioning and sense

of well-being and/or health-related quality of life (HRQOL) [23, 24]. Assessment of HRQOL is more than a measure of the number and severity of a smoker's nicotine withdrawal symptoms; it also quantifies changes in the perceived impact of smoking and smoking cessation on functioning and well-being. Research studies have shown that former and those who have never smoked report higher HRQOL scores than do smokers [25-31]. Therefore, if we want to help smokers stop smoking in order to increase their HRQOL, development of a pharmacist-delivered program appropriated for each specific smoker's group is to be considered.

Most of smoking cessation studies recruited smokers aged > 18 years old, thus the data of youth smokers have been limited [31]. The efficacy of pharmacotherapy for youths to quit smoking tends to have a low abstinence rate and not significantly difference from a placebo group [26-30]. In general, advice on medication use and lifestyle modification has been frequently used in smoking cessation program. The initial intervention should devote more time to smokers than the follow-up visits, but should take no longer than 30 or 40 minutes. The follow-up visits should take not more than 10 or 15 minutes [32]. A single session intervention may be appropriate for youths because some of them want privacy [32, 33] although, there was no significant difference between single session and multi session group intervention [34]. Counseling topics should emphasize on advantages of smoking cessation and dangers of continuous smoking [35]. Most smoking cessation programs conducted in general youths and used voluntary method because smoking was a self-experiment so many studies did not use compulsory smoking cessation treatment [36]. The compulsory method was often used in youth offenders who addicted to other illegal drugs such as amphetamine, heroin, marijuana, etc.. In general, youth offenders were judged by judge to treat their drug-addiction before punishment but this practice was not applied to cigarette smoking. In recent years, there has been no studies on the effectiveness of the compulsory method in helping the youth offenders to quit smoking and no study has determined the differences between the compulsory and voluntary smoking cessation methods.

While smoking cessation program is pivotal for smokers to quit smoking, the prevention program for nonsmokers from initiating smoking is also necessary. Most youths (75.0-92.6%) try to smoke cigarettes because of self-experiment or friends' persuasion [7]. Smoking behavior of youths' family, friends and others can influence

them to initiate smoking because they believe that cigarette smoking is the norm within their community [37-39]. A survey study showed that young people who had witnessed to smoking scenes, had a greater risk to initiate cigarette smoking [40]. Supawongse et al. 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, low educational levels and early school dropouts than those who did not. Moreover, it was also found that the more income the youth earned, the higher the rate of tobacco smoking was [41]. However, rigorously designed smoking cessation studies for youth has been limited, especially in youth offenders who smoke more cigarettes than other youth groups [7]. In Thailand, no smoking cessation studies have been conducted in youth offenders who are judged to impose restrictions on conduct. Therefore, the purpose of this study was to develop and evaluate a pharmacist-based smoking cessation program for this youths group.

Objectives

1. To evaluate the effectiveness of a pharmacist-based smoking cessation program for youth offenders who were judged to impose restrictions on conduct between compulsory and voluntary methods in terms of abstinence rate, health related quality of life and general knowledge of cigarette smoking.
2. To determine factors associated with the number of cigarettes smoked per day in youth offenders.
3. To analyse the costs of the development and implementation of a pharmacist-based smoking cessation program for youth offenders.

Hypotheses

1. Youth offenders who were judged to quit smoking by compulsory method would have the 7-day point prevalence abstinence rate and the continuous abstinence rate higher than those of voluntary method.
2. Youth offenders who were judged to quit smoking by compulsory method would demonstrate higher HRQOL scores than those of voluntary method on overall and each subscale of the instrument.

3. Factors of youth offenders e.g., gender, age, educational level, daily income or allowance, alcohol consumption, age started smoking, number of year smoked, a period of watching television per day, monthly income, marital status of parents and environmental factors such as number of smokers living at home, number of smokers in friends' group would be associated with the number of cigarettes smoked per day.

Significances of the study

This study would add to the knowledge base on the:

1. Effectiveness of the compulsory method for smoking cessation in youth offenders compared with the voluntary method. This would be helpful as a means to consider the method to be chosen and integrated when establishing smoking cessation program for this youths group.
2. Factors associated with the number of cigarettes smoked per day in youth offenders. These could be used to develop interventions for smoking prevention in youth's group.
3. Health related quality of life and general knowledge of cigarette smoking in youth offenders.
4. Cost of pharmacist-based smoking cessation program for youth offenders.

Operational definitions

1. Youth means a person aged between 11-18 years old.
2. Youth offender means a youth who committed offences under the Penal Code, and was punished to impose restrictions on conduct.
3. Compulsory method means youth offenders who were ordered to stop smoking by a judge and were recorded in condition of imposing restrictions on conduct.Voluntary method means youth offenders who were advised to stop smoking by a judge.
5. Pharmacist-based smoking cessation program means a program processed by a pharmacist e.g., to counsel on advantage of smoking cessation, dangers of continuous smoking, behavioral changing, using sodium nitrate mouthwash,

skills for avoidance an urge, willpower motivation, and follow-up visits arranged in 6 months.

6. Quit date means the day that youth stops smoking [42].
7. Seven-day point prevalence abstinence means a youth did not smoke during 7 days before follow-ups [42]. This research set follow-up date at day 7 (week 1), day 14 (week 2), day 28 (week 4), day 56 (week 8), day 84 (week 12), day 112 (week 16), day 140 (week 20) and day 168 (week 24) after the quit date (see Figure 1).
8. Continuous abstinence means a youth did not smoke throughout the follow-up periods [42]. This research set follow-up date at day 7 (week 1), day 14 (week 2), day 28 (week 4), day 56 (week 8), day 84 (week 12), day 112 (week 16), day 140 (week 20) and day 168 (week 24) after the quit date (see Figure 2).
9. Sodium nitrate mouthwash means a 0.5% sodium nitrate solution produced by Thanyarak Institute.
10. Treatment phase means a period from the first visit, which youth offenders attempt to stop smoking by using sodium nitrate mouthwash, until the quit date. The treatment phase must not be longer than 15 days.
11. Follow-up phase means a period after the quit date and follow-up visits arranged in 6 months.
12. Health related quality of life (HRQOL) means a multidimensional concept referring to person's total well-being including his or her psychological, social and physical health status [25, 43].
13. General knowledge of cigarette smoking means knowledge on advantage of smoking cessation, danger of continuous smoking, chemical substances in cigarette, nicotine withdrawal syndrome, behavioral changing and tobacco-control laws.
14. Cost of a pharmacist-based smoking cessation program means processing costs in counseling program by a pharmacist for youth offenders, calculated as followed:

    Costs of the program = Pharmacist's wages + Documentary expenses

    Pharmacist's wages = Pharmacist's working time x mean salary per minute
15. Verification of quit smoking means a youth offender did not smoke in follow-up phase, checked by a self-report and negative urine cotinine testing.

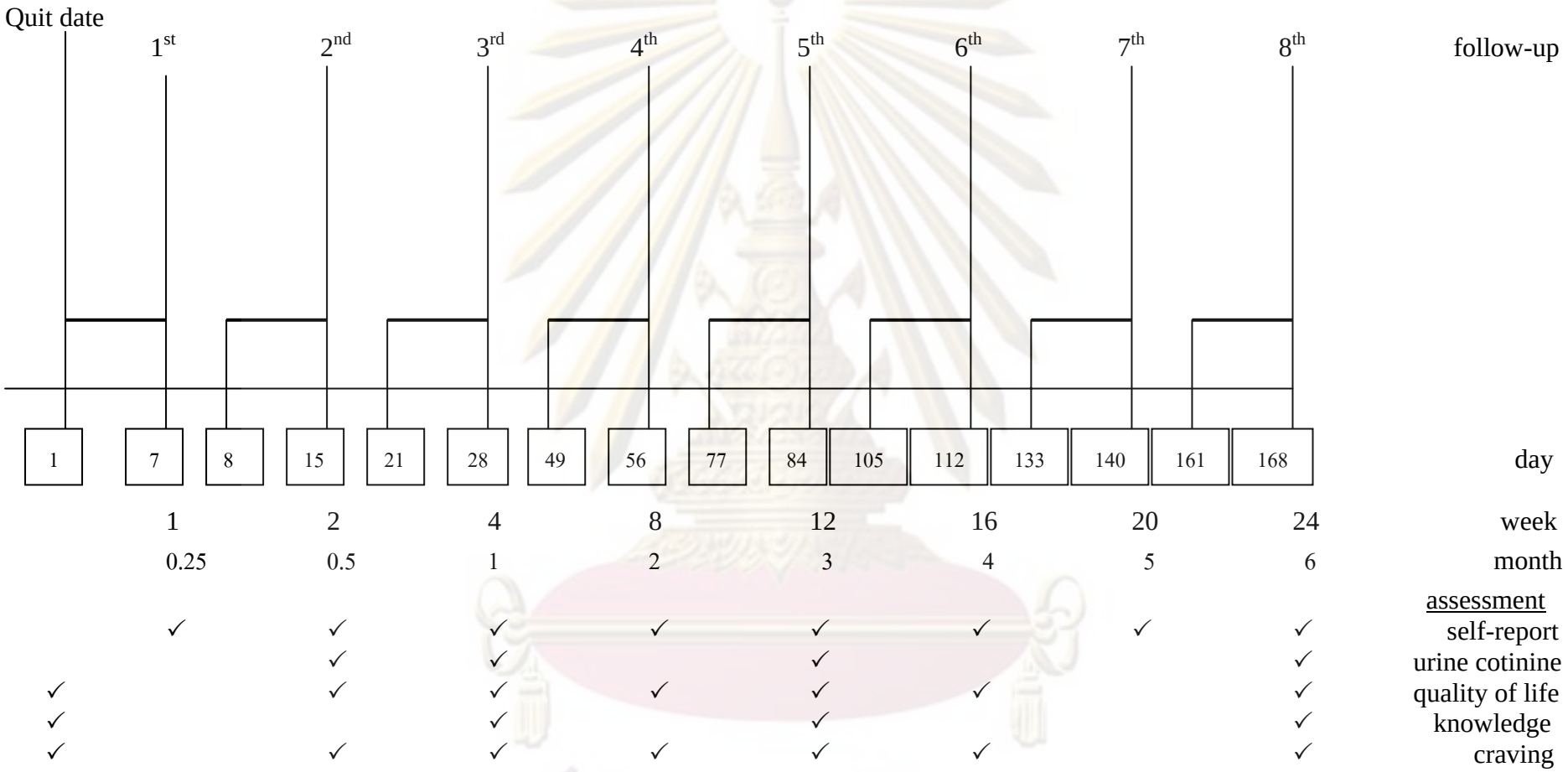
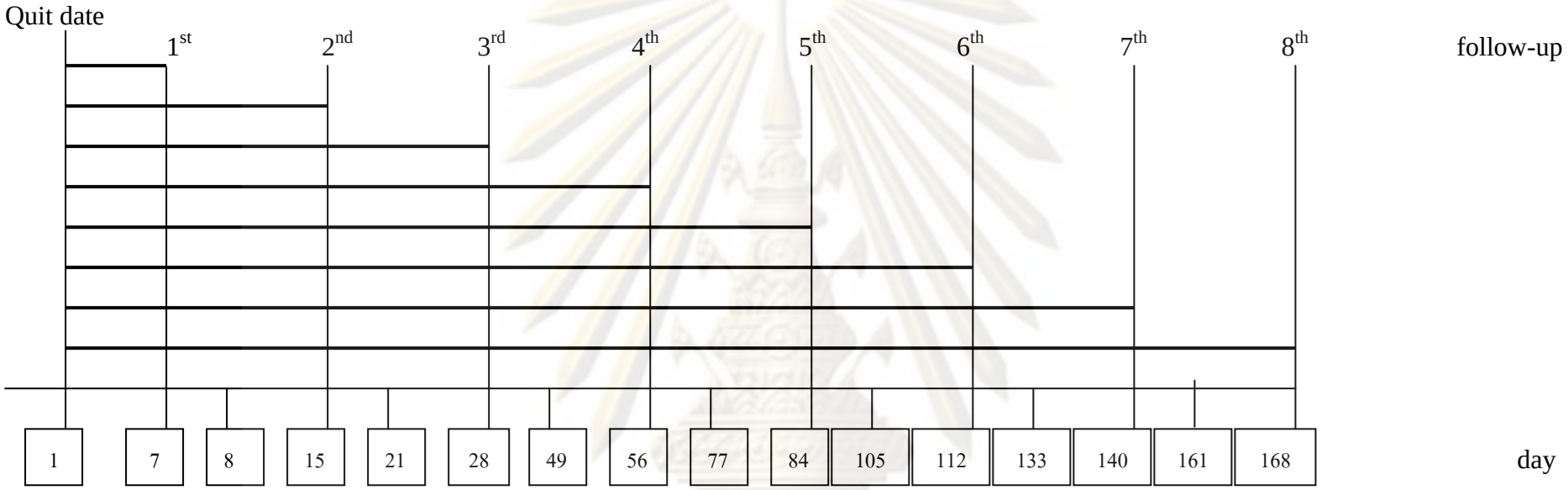


Figure 1 Seven-day point prevalence abstinence at follow-up phase



	1	2	4	8	12	16	20	24	week
	0.25	0.5	1	2	3	4	5	6	month
									<u>assessment</u>
	✓	✓	✓	✓	✓	✓	✓	✓	self-report
		✓	✓		✓			✓	urine cotinine
✓		✓	✓	✓	✓	✓		✓	quality of life
✓			✓		✓			✓	knowledge
✓		✓	✓	✓	✓	✓		✓	craving

Figure 2 Continuous abstinence at follow-up phase

CHAPTER II

REVIEW OF LITERATURE

This study was conducted to develop and evaluate a pharmacist-based smoking cessation program for youth offenders. This chapter is divided into 4 sections as followed: (1) pharmacotherapy of smoking cessation, (2) counseling methods, (3) pharmacist-based smoking cessation program, and (4) smoking cessation programs for youths.

1. Pharmacotherapy of smoking cessation

Currently, first-line agents for smoking cessation [13] are 5 formulations of nicotine replacement therapy (NRT), sustained-release bupropion, and varenicline. Two of the NRT formulations (gum and transdermal patch) were approved by Thai Food and Drug Administration (Thai-FDA) but the others (lozenge, inhaler and nasal spray) were not. Although nortriptyline and clonidine are considered as second-line agents and significantly increase long-term abstinence rates compared with placebo, these medications require a prescription and currently do not have an FDA approved indication for smoking cessation. Wongwiwatthananukit [20, 21] classified medications or products for smoking cessation into 13 groups by their mechanisms.

1) Nicotine acetylcholine receptor agonist or replacement (substitution) therapy - Nicotine replacement therapy
2) Nicotine-like effects (antidepressants) – Bupropion, Nortriptyline, Clonidine
3) Nicotine acetylcholine receptor antagonist (blockade therapy) – Mecamylamine, Anabaseine
4) Selective cannabinoid type 1 receptor antagonist – Rimonabant
5) Selective monoamine oxidase B inhibitor – Selegiline
6) Partial nicotine acetylcholine receptor agonist – Varenicline
7) Dopaminergic agonist – Bromocriptine
8) Deterrent therapy – Silver acetate, Sodium nitrate
9) Sensory stimulant – Ascorbic acid, Citric acid, Glucose, Cloves
10) Immunotherapy – Nicotine vaccines

11) Pharmacogenetics – CYP2B6 genotype to predict the response to bupropion
12) Combination of pharmacotherapies
13) Herbs – *Vernonia cinerea*, *Plantigo major*, *Clausena heptaphyllas*

Currently, 5 dosage forms of nicotine replacement therapy (NRT) are gum, patch, inhaler, nasal spray and lozenge. Each of these agents, by supplying an alternative source of nicotine, facilitate the smoking cessation attempt by decreasing the craving and withdrawal symptoms while achieving some perceived positive effects [44]. Although NRT is appropiate for most smokers, caution should be taken in smokers who have had a myocardial infarction within the preceding 2 weeks, serious arrhythmias, or serious angina pectoris [13]. The main mechanism of action of NRT is thought to be stimulation of the nicotine receptors in the brain's vental tegmental area, which results in release of dopamine into the nucleus accumbens. The onset of action for NRT is not as rapid as that of nicotine obtained through smoking, so smokers who use NRT become less habituated to the nearly immediate, reinforcing effects of inhaled nicotine [13, 45].

Nicotine is well absorbed from many sites, including the lung, skin, nasal and buccal mucosa. Nicotine absorption is pH dependent, and lower systemic concentrations are achieved under acidic conditions. Nicotine also is well absorbed from the gastrointestinal tract (small intestine) but undergoes extensive first-pass hepatic metabolism resulting in low systemic levels of nicotine [46]. The major difference between the various NRT formulations is the site and rate of nicotine absorption. All of the NRT formulations deliver nicotine less rapidly and achieve lower serum nicotine levels than do cigarettes. Peak serum concentrations are achieved most rapidly with the nasal spray (10 to 15 minutes) followed by the gum, lozenge, and inhaler (15 to 30 minutes), and then the transdermal patch (4 to 9 hours) [47, 48]. In contrast, significantly higher peak nicotine levels are attained within 10 minutes after smoking a cigarette (Figure 3).

Although there are differences in patient preference and tolerability, short-term abstinence rates for any dosage forms are similar. Clinical practice guideline released by the Agency for Healthcare Research and Quality (AHRQ) list each form as a first-line therapy for the treatment of nicotine dependence [49].

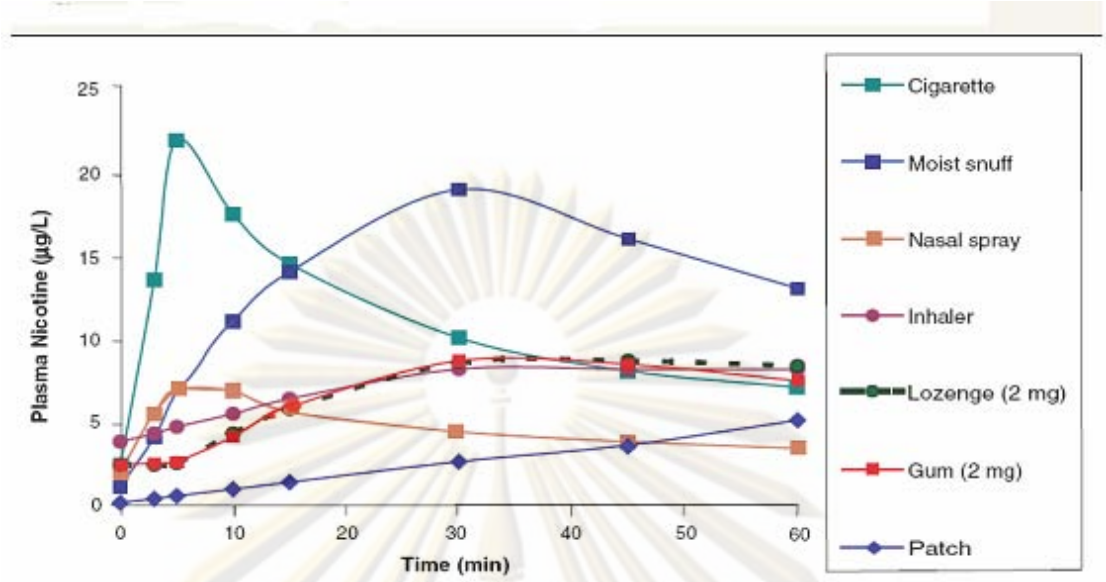


Figure 3 Plasma nicotine concentration for various nicotine delivery systems [45]

The AHRQ recommendations are based on meta-analyses conducted on all trials meeting certain criteria. To be included in the meta-analyses, studies had to be randomized, placebo or comparison controlled trials that provided follow-up results at least 5 months after the quit date and had been published in peer-reviewed journals in English [13]. The efficacy of the AHRQ-recommended pharmacotherapies is summarized in Table 1. Abstinence rates and odds ratio (OR) provided by this analysis should not be compared across products.

When smokers use NRT for quit smoking, they should be instructed not to smoke cigarettes or other forms of tobacco (e.g., snuff, chewing tobacco, cigars, pipes). Use of tobacco in combination with NRT may result in higher serum nicotine concentrations than those achieved from tobacco products alone, and increase the likelihood of nicotine-related adverse effects including nausea, vomiting, hypersalivation, perspiration, abdominal pain, dizziness, weakness, and palpitations [45]. Nicotine is classified by the FDA as pregnancy category D; there is evidence of risk to the human fetus [50]. Although nicotine is excreted in breast milk, the nicotine levels produced by NRT are quite low and likely not hazardous in infants [51]. Despite potential risks, the use of NRT during pregnancy is probably safer than smoking [51, 52], and NRT might be warranted in selected smokers who are unable to quit by using nonpharmacologic method alone, or in situations in which the increased likelihood of quitting outweighs the risks associated with NRT use [13]. Furthermore,

the safety and efficacy of NRT have not been established in adolescent smokers, and none of the NRT products are currently indicated for use in this population [13]. Evidence to date suggests that NRT may be used to alleviate withdrawal symptoms in adolescents concerned of the withdrawal brought about by quitting, but abstinence rates will likely be enhanced only with adjunctive psychosocial or cognitive behavioral therapies [44].

Table 1 Methods for smoking cessation: estimates of first-line agents compared to placebo at 6-month post quit

Pharmacotherapy	**Estimated Odds Ratio[a] (95% CI)**	**Estimated Abstinence Rate[b] (95% CI)**
Placebo	1.0	13.8
Monotherapy (first-line agents)		
Sustained-release bupropion	2.0 (1.8–2.2)	24.2 (22.2–26.4)
Nicotine gum (6–14 weeks)	1.5 (1.2–1.7)	19.0 (16.5–21.9)
Nicotine inhaler	2.1 (1.5–2.9)	24.8 (19.1–31.6)
Nicotine lozenge (2 mg)	2.0 (1.4–2.8)	24.2[c]
Nicotine patch (6–14 weeks)	1.9 (1.7–2.2)	23.4 (21.3–25.8)
Nicotine nasal spray	2.3 (1.7–3.0)	26.7 (21.5–32.7)
Varenicline (2 mg/day)	3.1 (2.5–3.8)	33.2 (28.9–37.8)
Combination therapy (first-line agents)		
Nicotine patch (>14 weeks) + ad lib NRT (gum or nasal spray)	3.6 (2.5–5.2)	36.5 (28.6–45.3)
Nicotine patch + bupropion SR	2.5 (1.9–3.4)	28.9 (23.5–35.1)
Nicotine patch + nicotine inhaler	2.2 (1.3–3.6)	25.8 (17.4–36.5)

[a] estimated relative to placebo
[b] abstinence percentages for specified treatment
[c] one qualifying randomized trial; 95% CI not reported in the 2008 Clinical Practice Guideline

Sustained-release bupropion is thought to affect dopamine and norepinephrine levels, decreasing the cravings for cigarettes and nicotine withdrawal symptoms [13]. Therapy is initiated with a dose of 150 mg orally every morning for 3 days, followed by 150 mg twice daily for 7 to 12 weeks. Because steady-state levels are reached after approximately 7 days of therapy, smokers set their quit date for 1 to 2 weeks after commencing therapy. Insomnia, headache and dry mouth are the most common side effects reported with bupropion. Because seizures have been reported in approximately 0.1% of smokers, bupropion is contraindicated in smokers who (1) have seizure disorder, (2) have a current or prior diagnosis of anorexia or bulimia nervosa, (3) are undergoing abrupt discontinuation of alcohol or sedatives (including benzodiazepines), (4) are currently using or have used a monoamine oxidase inhibitor

within the past 14 days, or (5) are currently being treated with any other medications that contain bupropion [45]. Other factors that might increase the odds of seizure and are classified as warnings for this medication include a history of head trauma or prior seizure, central nervous system tumor, the presence of severe hepatic cirrhosis, and concomitant use of medication that lower the seizure threshold. Bupropion can be used safely in combination with NRT and may be beneficial for use in smokers with underlying depression [45].

Varenicline was granted US-FDA approval for treating nicotine addiction in May 2006. It is an $\alpha 4\beta 2$ neuronal nicotine acetylcholine receptor partial agonist that binds in the central nervous system and produces low to moderate levels of dopamine, mimicking nicotine's effect and reducing withdrawal symptoms. It also acts as an antagonist, blocking the binding of nicotine and therefore the positives reinforcement obtained through smoking [53]. Treatment should continue for 12 weeks, initiated with a dose of 0.5 mg orally once daily for 3 days, followed by 0.5 mg twice daily for 4 days, and added to 1 mg twice daily for 11 weeks. Because steady-state levels are reached after approximately 7 days of therapy, smokers set their quit date for 1 to 2 weeks after commencing therapy. Nausea, headache and insomnia are the most common side effects reported with verenicline [54, 55].

2. Counseling methods

Clinical practice guideline suggested "5 A's" strategy for smoking cessation counseling [13]. Five key components of comprehensive counseling for smoking cessation are: (1) asking smokers whether they use tobacco, (2) advising smokers to quit, (3) assessing smokers' readiness to quit, (4) assisting smokers with quitting, and (5) arranging follow-up care.

Ask : A key first step is asking about tobacco use. The history of smoking should be treated as vital signs or allergy history. The question should be used to identify all types of tobacco use and level of use such as number of cigarettes smoked per day. After interviewing the smoking history, we can categorize these smokers into 3 groups: current smoker, ex-smoker, and never smoker. The smoking history should be documented in the medical record and reassessed periodically.

Advise : All smokers should be advised to quit. The advice should be clear and compelling, yet delivered with sensitivity and tone of voice that communicates concern for the smoker and willingness to assist the smoker with quitting when he or she is ready. When possible, counselors should personalize the messages by linking the advice to the smoker's health status such as current medication regimen, personal reasons for wanting to quit, and the impact of tobacco on others.

Assess : Because many smokers will not be ready to quit in the near future, it is important for counselors to gauge smokers' readiness to quit before recommending a treatment regimen. The willingness to quit may be assessed by using Transtheoretical model (TTM). Smoker should be categorized as: (1) not ready to quit in the next month (precontemplation and contemplation), (2) ready to quit in the next month (preparation), (3) a recent quitter, having quit in the past 6 months (action), or (4) a former user, having quit more than 6 months ago (maintenance) [45, 56].

Assist : Important elements of the assist component of treatment include helping smokers to make the decision and commitment to quit and setting an actual quit date. Counselors should be sympathetic to the fact that quitting is a difficult process. As such, the goal is to help maximize smokers' chances of success by designing an individualized treatment plan. Except in the presence of special circumstances, all smokers attempting to quit should be encouraged to use pharmacotherapy combined with some forms of nonpharmacologic intervention, as this combination will yield higher abstinence rates than either approach alone [13, 57]. Nonpharmacologic methods, which focus on promoting behavior change, include tapering the number of cigarettes (e.g., setting a quit date and applying a scheduled, gradual reduction strategy), reading self-help materials, and entering a formal cessation program (face-to-face counseling, telephone counseling, or group program).

Arrange : Because a smoker's ability to quit increases substantially when multiple counseling interactions are provided, arranging follow-up counseling is an important, yet typically neglected, element of treatment for tobacco dependence.

Follow-up contact should occur soon after the quit date, preferably within 2 weeks [58]. A second follow-up contact is recommeded within the first month after quitting [13]. Periodically, additional follow-up contact should occur, to monitor smoker progress and to provide ongoing support. Long-term follow-up contact of at least 6-12 months is essential, espicially in adolescent smokers who will relapse within 1 year [59]. Abstinence rates are associated with the total number of follow-up contacts: 12.4% for 0-1 contact, 16.3% for 2-3 contacts, 20.9% for 4-8 contacts, and 24.7% for more than 8 contacts [13].

When counseling a smoker, the goal is to facilitate forward progress in the process of change, assisting smokers to develop "readiness" for permanent cessation. It is important that counselors view quitting as a process that might take months or even years to achieve, rather than a "now or never" event [45].

Counseling smokers who are not ready to quit

When counseling smokers who are not ready to quit, an important first step is to motivate the smokers to start thinking about quitting, to compare pros and cons of continued smoking versus cessation, and to consider making the difficult decision to quit sometimes in the foreseeable future. Sometimes smokers who are not ready truly do not understand the need to quit. In general, most smokers will recognize the need to quit but are not yet ready to make the commitment to quit. Many smokers will have tried to quit multiple times and relapsed, and thus might feel too discouraged to try again. Strategies for working with smokers who are not ready to quit include increasing smokers' awareness of the available treatment options, having smokers identify their reasons for smoking and for wanting to quit, and identifying barriers to quitting. Counselors can motivate smokers to begin thinking about quitting by raising awareness of specific drug interactions between medications and smoking, and how tobacco use can induce or exacerbate medical conditions. A treatment goal at this stage should be to promote motivation to quit, and this can be accomplished by providing tailored, motivational messages, applying what is referred to as the "5 R's" [45, 56].

Relevance : Encourage smokers to think about why quitting is important to them. Because information has a greater impact if it takes on a personal meaning, counseling should be framed to related to the smoker's risk for disease or exacerbation of disease, family or social situation (e.g., having children at home), health concerns, age, gender, and other important smoker characteristics (e.g., prior quitting experience, personal barriers to cessation)

Risks : Ask smokers to identify negative health consequences of smoking, such as acute risks (e.g., shortness of breath, asthma exacerbations, pregnancy complication, infertility), long-term risks (e.g., cancer, cardiac and pulmonary diseases), and environmental risks (e.g., effects of secondhand smoke on others, including children and pets, role modeling unhealthy behaviors around children and adolescents).

Rewards : Ask smokers to identify specific benefits of quitting, such as improved health, enhanced physical permanence, acuity of taste and smell, saved money, less time waste or work missed, reduced health risks to others (fetus, children, housemates), and reduced skin aging .

Roadblocks : Help smokers identify significant barriers to quitting, and assist in developing coping skills to address or circumvent each barrier. Common barriers include nicotine withdrawal symptoms, fear of failure, a need for social support while quitting, depression, concern about weight gain, and a sense of deprivation or loss.

Repetition : Continue to work with smokers who are either not motivated to quit or have been unsuccessful in quitting. Discussing circumstances in which smoking occurred will help identify triggers for relapse and should be viewed as part of the learning process. Smokers who have failed in previous quit attempts, should be told that most people make repeated quit attempts before they are successful.

Counseling smokers who are ready to quit

For smokers who are ready to quit in the next month, counselors can either provide comprehensive counseling or refer to local smoking cessation programs or a

toll-free telephone quitline. The goal for this group is to achieve cessation by providing an individualized treatment plan. The first step is to discuss the smoker's tobacco use history, inquiring about levels of smoking, number of years smoked, methods used previously for quitting, and reasons for previous failed quit attempts. Counselors should understand fully the smoker's preferences for the different pharmacotherapies for quitting, and work with smokers in selecting the quitting methods (e.g., medications, behavioral counseling programs). Because the pharmaceutical aids might not be desirable or affordable for all smokers, counselors should educate smokers that medications, when taken correctly, can substantially increase the likelihood of quitting [45].

In general, smokers should be encouraged to select a quit date which is more than 2 days but less than 2 weeks away. This time frame provides smokers with long time to prepare themselves and their environment prior to the actual quit date. This includes removing all tobacco products and ashtrays from the house, car, and workplace. Smokers should be advised to discuss their desire to quit with their family, friends, and coworkers and request their support and assistance. It is helpful to have smokers think about when and why they smoke, this information is useful for anticipating situations that might trigger a desire to smoke and contribute to relapse. Additional counseling strategies to address with smokers during a quit attempt should be advised such as cognitive and behavioral changes. Smokers should be counseled on proper medication use, side effects, and adherence.

Cognitive changes focus on retraining the way a smoker thinks. Often smokers mentally deliberate on the fact that they are thinking about a cigarette, and this leads to relapse. Smokers must recognize that thinking about a cigarette does not mean they need to have one. For example, remind themselves that cravings and temptations are temporary and will pass, say "I can do this" and remember previous difficult situations in which tobacco use was avoided with success. Behavioral changes involve specific action to reduce risk for relapse such as reduce stress, limit or abstain from alcohol, limit prolonged contact with individuals who are smoking during the early stages of quitting, use nontobacco oral substitutes (e.g., gum or candy), plan and prepare meal by increase fruit, vegetable, and water intake, and change routine activities (e.g., smoking with morning coffee, smoking while driving, smoking after meals). Cravings for tobacco are temporary and usually pass within 5-

10 minutes. Handle cravings through distractive thinking, taking a break, changing activities, taking deep breaths, or performing self-massage.

Counseling smokers who recently quit

Smokers who recently quit will face frequent, difficult challenges in countering withdrawal symptoms and cravings or temptations to use tobacco. It is important to help them identify situations that might trigger relapse and suggest appropriate coping strategies. Because smoking is a habitual behavior, smokers should be advised to alter their daily routines. This help to disassociate the behaviors from the tobacco.

Often, smokers expect that they can change their behaviors over a short period of time (weeks to months), yet experts believe smokers must remain vigilant for at least 6 months before a new behavior is adopted or an old behavior is extinguished [60]. If a smoker indicates he or she has quit smoking, it is important to ask for how long he or she has been abstinent. Many persons who quit tobacco smoking will experience cravings for years and even decades after quitting. Thus, relapse prevention counseling should be part of every follow-up contact with smokers who have recently quit smoking. Smokers who slip and smoke a cigarette or experience a full relapse to habitual smoking should be encouraged to think through the scenario in which smoking first recurred and identify the triggers for relapse. Identifying triggers will provide valuable information for future quit attempts.

Counseling former smokers

Although smokers who have quit and not smoked for 6 or more months can be considered former smokers, many remain vulnerable to relapse. The strategies to be applied for former smokers are similar, but typically less intensive, than those to be applied for recent quitters. The goal for these former smokers is to remain tobacco-free for life. Counselors should evaluate their quit attempt and coping strategies that former smokers have any strong temptations to use tobacco, or any occasional use of tobacco. Also, it is important to ensure that they are appropriately terminating or tapering off of pharmacotherapy products. Former smokers should be congratulated for their enormous success.

3. Pharmacist-based smoking cessation program

Pharmacists are ideally situated to interact with individuals obtaining medications for smoking-related illnesses. Pharmacists consider smoking cessation counseling as one of their important activities [61]. Few pharmacists are formally trained to provide smoking cessation counseling [62]. However, opportunities for pharmacists to receive such training are increasing [63], and have been shown to increase confidence, quality, and provision of counseling [62]. Automation technology and certified technicians alleviate pharmacists from traditional dispensing responsibilities. In addition, updated pharmacy practice laws, allowing for collaborative practice agreements with physicians, empower pharmacists to initiate and modify drug therapy for patients, including smoking cessation [64].

Dent et al. conducted a systematic review of literature published between 1980 and 2006 regarding pharmacist-based smoking cessation services [14]. There were 5 randomized controlled trials and 10 cohort studies. Findings of the cohort studies suggested that pharmacists can deliver smoking cessation program. Three of the controlled studies found statistically significant differences between the pharmacist-based intervention and the control group, and the trend in the other 2 studies was toward the effectiveness of the pharmacist-based intervention.

In addition, Dent et al. conducted an open-label, prospective, randomized, controlled trial to assess the effectiveness on smoking cessation of a face to face group program conducted by the pharmacist team compared with a brief standard care session delivered by a pharmacist over the telephone [65]. Participants (N=101) were randomly assigned to receive a 3-session face to face group program conducted by the pharmacist team or one 5-10-minute standard care session delivered by the pharmacist team over the telephone. Participants in both groups were offered either bupropion or nicotine patch at no cost. At 6 months after the quit date, the 7-day point prevalence abstinence rate was 28.0% in the pharmacist-based face to face treatment group and 11.8% in the standard care group ($p<0.041$). This study suggested that pharmacists are effective providers of smoking cessation interventions. Table 2 shows the pharmacist-based smoking cessation studies.

Table 2 Pharmacist-based smoking cessation studies

Study	Age (years)	Interventions (N)	Research design	Duration	% Abstinence rate
Dent et al. (2009) [65]	56.7 ± 9.8 55.0 ± 9.5	Pharmacist-delivered program (50) Standard care (51)	RCT	6 months	**PA** 6 months: 28.0 11.8
Vial et al. (2002) [17]	N/A	Pharmacy hospital (35) Pharmacy community (34) Standard care (33)	RCT	1 year	**PA** 1 year: 22.9 14.7 3.0
Maguire et al. (2001) [16]	17-72	Pharmacist-delivered program (265) Standard care (259)	RCT	1 year	**CA** 1 year: 14.3 2.7
Howard Pitney et al. (1999) [15]	N/A	Nicotine patch + Counseling by pharmacist Placebo patch + Counseling by pharmacist	RCT	6 months	**PA** 6 months: 38.0 34.0
Sinclair et al. (1998) [19]	17-77	Pharmacist-delivered program (224) Standard care (268)	RCT	9 months	**CA** 9 months: 11.6 7.1
Sonderskov et al. (1997) [18]	38.2 ± 12.9	Nicotine patch + Counseling by pharmacist (136) Placebo + Counseling by pharmacist (142)	RCT	6 months	**PA** 6 months: 11.0 4.0

CA = Continuous abstinence, PA = Point prevalence abstinence, RCT = Randomized controlled trial

Furthermore, there was a prospective, open-label trial which observed pharmacist-based smoking cessation programs by evaluating smokers' quality of life. Changing in health-related quality of life (HRQOL) during the cessation attempt was evaluated as a secondary goal (N=31). Mean age was 41.2 $\pm$ 10.5 years old. All subjects received nicotine transdermal patch and attended weekly of 1-hour group counseling for 12 weeks. After follow-up, the continuous abstinence rates at 3 and 6 months were 42% and 26%, respectively and HRQOL improved within 3 months after abstinence [25].

From the above data, it was concluded that pharmacists were particularly well-suited to provide smoking cessation intervention because of immediate accessibility and ability to assist with counseling, initiation of drug therapy, and easy follow-up for support or medication-related problems. However, most pharmacist-based smoking cessation programs were studied in adult smokers, thus the pharmacist-based smoking cessation for youth smokers should be further studied.

4. Smoking cessation programs for youths

Recently, tobacco use among youths is already well known in many parts of the world. Nearly 20% of 13-15 years old youths use some types of tobacco product, and among those smoking cigarettes, nearly 25% smoked their first cigarette before the age of 10 years [66]. Most countries concentrate on public health policy for smoking cessation in adults, and programs are mainly tailored to the adult smokers. Although the main tobacco control effort for young people is focused on prevention, a significant amount of work has been done to develop cessation programs for youths. These programs acknowledge that although majority may not want to quit, a significant minority want to quit, and need support. In addition, it is generally held that knowledge about quitting may be useful as youth mature and develop their motivation to quit. As the evidence showed that those who do not smoke before the age of 20 years are significantly less likely to start at adults, a strong case can be made for programs for youths that address both prevention and treatment [67].

Thorndike et al. showed that youth's smoking status was identified in 72.4% of office visits, but smoking cessation counseling was provided at only 16.9% of clinic visits of young smokers [58]. Therefore, counselors need to assess youth

tobacco use and offer cessation counseling. Counselors may use motivational interventions or consider technics adapted for use with youths. Also, youths may benefit from community- and school-based intervention activities [13]. A comprehensive review of youth cessation programs in a variety of settings had concluded that such programs produce abstinence rate that exceeds naturally occuring abstinence rates, but more and higher quality research need to be done [68]. Youths also benefit from the delivery of information to parents regarding secondhand smoke exposure. A review of the studies conducted by the expert panel showed that the delivery of information to parents regarding the harms of exposing youth to secondhand smoke reduces childhood exposure to secondhand smoke and may reduce parental smoking rates [13].

Despite the considerable evidence that pharmacotherapies such as nicotine replacement therapy and bupropion are effective for adult smokers, the same level of evidence does not exist for youth smokers [13]. Youths do experience cravings to smoke and nicotine withdrawal, but on the whole, they tend to be lighter smokers than adults and more likely to have lower levels of nicotine dependence [69]. Because nicotine replacement therapy may be effective only with heavy smokers, it is at least conceivable that pharmacotherapy may not be appropriate with a large proportion of youth smokers [70]. Therefore, routinely recommend of pharmacotherapies without further research is unjustified. For smoking cessation by person under 18 years old, the over-the-counter and prescription pharmacotherapies have not been approved by the US-FDA, Health Canada, or most of other national regulatory agencies [71]. Few pharmacotherapy studies have been published regarding youth smokers, data as shown in Table 3. There are 4 randomized control trials which determined the efficacy of nicotine replacement therapy and the other 4 studies had no comparison with placebo. Abstinence rates seem to be high in the first study (PA of 10 weeks) , but tend to be lower in the other long-term follow-ups and slightly lower than those from adult studies.

Table 3 Pharmacotherapy studies in youth smokers

Study	Age (years)	Interventions (N)	Research design	Cigarettes per day	Duration	% Drop out	% Abstinence rate
Hanson et al. (2003) [72]	13-19	Nicotine patch (50) Placebo (50)	RCT	16.3 ± 4.9	6 months	52.0 42.0	**PA** 10 weeks: 28.0 24.0
Stotts et al. (2003) [26]	14-19	Nicotine patch + Counseling (98) Placebo patch + Counseling (100) Counseling (105)	RCT	N/A	1 year	38.8 38.0 57.1	**PA** 1 year: 12.2 23.0 14.3
Moolchan et al. (2005) [73]	13-17	Nicotine patch (34) Nicotine gum (46) Placebo (40)	RCT	18.8 ± 8.56	6 months	47.1 58.7 60.0	**PA** 6 months: 20.6 8.7 5.0
Killen et al. (2004) [27]	15-18	Nicotine patch + Bupropion (103) Nicotine patch + Placebo (108)	RCT	15.1 ± 5.33 15.7 ± 6.40	6 months	37.9 35.2	**CA** 6 months: 8.0 7.0
Smith et al. (1996) [74]	13-17	Nicotine patch (22)	Cohort	23.3 ± 5.0	6 months	13.6	**CA** 3, 6months: 4.6
Hurt et al. (2000) [29]	13-17	Nicotine patch (101)	Cohort	18.2 ± 6.2	6 months	51.5	**CA** 6 months: 5.0
Franken et al. (2006) [75]	13-17	Nicotine patch & gum (66)	Cohort	19.0 ± 8.4	3 months	N/A	**CA** 3 months: 12.0
Upadhyaya et al. (2004) [76]	12-19	Bupropion (16)	Cohort	18.1 ± N/A	6 weeks	43.8	**PA** 6 weeks: 31.3

CA = Continuous abstinence, PA = Point prevalence abstinence, RCT = Randomized controlled trial

Sussman reviewed 66 of youth non-pharmacotherapies smoking cessation programs between year 1975-2000 [77]. The mean abstinence rate at a 3- to 12-month average follow-up among the program condition was 12%, compared to approximately 7% across control groups. A comparison of intervention theories revealed that motivation enhancement and contingency-based reinforcement programs showed higher abstinence rates than the overall intervention cessation mean. Motivation enhancement are technics to clarify desire for change and reduce ambivalence toward change. This may include, but is not restricted to, a specific strategy such as motivational interviewing. Contingency-based reinforcement mean reinforcement of quit behavior with the chance for extrinsic rewards such as money or prizes. Similarly as Grimshaw et al.'s study [67], reviewed 15 trials, covering 3,605 young smokers, results suggested that motivational interviewing achieved a pooled odds ratio of 2.05 (95% CI : 1.1-3.8) which showed higher odds ratio than any intervention cessation. Evidence to date suggests that pharmacotherapies may be used to alleviate withdrawal in youth concerned about the nicotine withdrawal brought about by quitting, but abstinence rates will likely be enhanced only with adjunctive psychosocial or cognitive behavioral therapies.

Currently, pharmacists are effective providers of smoking cessation interventions. Greater use of pharmacists in smoking cessation programs/services could have a significant impact on smoking prevalence, prevention of tobacco-related illnesses, and improvement in the public health. But the data about pharmacist-based smoking cessation for young smokers have been limited. Nicotine replacement therapy has been shown to be safe in youths, however, there is little evidence that this medication and bupropion are effective in promoting long-term smoking abstinence among young smokers. As the result, pharmacotherapies are not recommended as a component of youth smoking cessation intervention. Moreover, no studies has conducted in youth offenders who smoked more cigarettes than other youth groups. Therefore, this quasi-experimental, nonequivalent pretest-posttest control group study was conducted to evaluate the effectiveness of a pharmacist-based smoking cessation program for youth offenders who are judged to impose restrictions on conduct between the compulsory and the voluntary methods in terms of: (1) abstinence rate, (2) health related quality of life, and (3) general knowledge of cigarette smoking.

CHAPTER III

METHODS

This chapter describes how the study was conducted and divided into two sections. The first section describes the subjects in this study, including subject selection and sample size estimation. The second section describes methods, including study design and procedures, laboratory measurement, instruments, and statistical analysis.

1. Subjects

1.1 Subject Selection

Subjects in this study were youth offenders who committed a crime and were judged to behavior restraining at Juvenile and Family Section, Pathumtani Provincial Court from January 1 to September 30, 2008 and met the following criteria:

Inclusion criteria:

1. committed a crime and were sentenced to behavior restraining
2. aged between 11-18 years
3. smoked cigarettes regulary in the past 6 months (≥ 2 cigarettes/day)
4. able to communicate in Thai language
5. willing for interviews and urine collection
6. no period of abstinence > 12 months in the previous years

Exclusion criteria:

1. used other forms of tobacco products other than cigarettes e.g., snuff, chewing tobacco, cigars, pipes or had history of drug abuse eg., amphetamine, ecstasy, heroin, marijuana in the previous years
2. had a history of diseases including cardiovascular, cerebrovascular, gastrointestinal, endocrine, cancer, pulmonary disease, hepatic and renal impairment, neurologic and psychiatric disorders

1.2 Sample Size Estimation

An estimated sample size was calculated by using an equation, at an α significance level of 0.05 (i.e., Type I error) and a power of 80%. The differences of continuous abstinence rates between the compulsory and voluntary methods were assumed using data from the smoking cessation clinic at Thanyarak Institute from October 1, 2005 to September 30, 2006. Data revealed that among 330 of voluntary youths, the continuous abstinence rate at 6 months was 9.69% (N=32). In recent years, no data regarding the compulsory method has been studied, so the investigator assumed that the difference of continuous abstinence rates between two groups was approximately 18%.

The sample size was calculated from the following equation:

$$N = \frac{(Z_\alpha + Z_\beta)^2 \, 2P'(1-P')}{D^2} \quad ; P' = \frac{P_1+P_2}{2}, \quad D = P_1 - P_2$$

Determination : $\alpha = 0.05$ (two-sided); $Z_\alpha = 1.96$

$\beta = 0.2$ (one-sided); $Z_\beta = 0.84$

$P_1 = 0.09$

$P_2 = 0.27$

$P' = (0.09 + 0.27)/2 = 0.18$

$D = 0.27 - 0.09 = 0.18$

So,
$$N/\text{group} = \frac{(1.96 + 0.84)^2 \, 2(0.18)(1 - 0.18)}{(0.18)^2}$$

$$= 72 \text{ subjects}$$

Estimate drop out 20%,
$$N/\text{group} = \frac{72}{(1 - 0.2)} \approx 90 \text{ subjects}$$

Therefore, 180 subjects were recruited for this study (90 subjects per group)

1.3 Subject allocation

One hundred and eighty youth offenders were assigned equally into two groups by judge's discretion, consideration was made from severity of the criminal case and youth offender's family support. Ninety youth offenders in the study group were sentenced to stop smoking by compulsory and those in the control group were sentenced to stop smoking by voluntary. All youth offenders in both groups were

then included in a pharmacist-based smoking cessation program at the outpatient department of Thanyarak Institute, Pathumtani, Thailand.

2. Methods

2.1 Study Design and Interventions

A quasi-experimental, nonequivalent pretest-posttest control group trial was conducted from January 1, 2008 to March 15, 2009 at the outpatient pharmacist-based smoking cessation program of Thanyarak Institute. The study protocol was approved by the Human Subjects Research Committee of Thanyarak Institute. Prior to conducting the study, the patient demographic and record forms were developed including:

1. General history and smoking history form (appendix A)
2. Fagerstrom Test for Nicotine Dependence (appendix B)
3. Transtheoretical Model Stages of Change (appendix C)
4. "Why are you still smoking ?" questionnaires (appendix D)
5. Follow-up visit record form (appendix E)
6. Thai Smoking Cessation Health-Related Quality of Life (TSCHRQOL) instrument (appendix F)
7. General knowledge of cigarette smoking test questionnaires (appendix G)
8. Withdrawal and Craving scale test (appendix H)
9. Consent form (appendix I)
10. Self-report of abstinence form (appendix J)

The study was implemented through two major steps. The first step was the development of a pharmacist-based smoking cessation program by adaptation from the previous studies [32-34, 78, 79] and selected the most appropriate interventions for subject groups in terms of time sequences of counseling, counseling patterns, smoking cessation drug therapy, data collection and follow-up periods. There was only one licensed clinical pharmacist (the investigator) responsible for the pharmacist-based smoking cessation program and a face to face counseling intervention in this study. For the first visit, each subject was provided with the documents regarding the advantages of smoking cessation, dangers of continuous smoking within 30-40 minutes. They were counseled on behavioral modification and social supports, the

use of sodium nitrate mouthwash, skills for prevention of the urge to smoke cigarette, willpower motivation and setting a target quit date (not more than 14 days after the first visit). All documents were supported by The Action on Smoking and Health Foundation. At the target quit date, youth offenders were reminded to stop smoking by telephone contact from the investigator. If they were not able to contact by telephone, the investigator will contact their parents or guardians by telephone or by mail. The follow-up period was 24 weeks with 6 clinic visits (weeks 2, 4, 8, 12, 16, and 24) after the target quit date. All of the follow-up visits were arranged at Thanyarak Institute. Youth offenders were counseled by the clinical pharmacist similar to the first visit and were also asked for their smoking status, problems occurred after quiting smoking and helped them solve problems, if any occurred, within 10-15 minutes. If youth offenders had any problems regarding smoking cessation while staying at home, they could call the investigator at any time. The contents of counseling method in this program are shown in the appendix K

The second step was dealt with the program evaluation. The judges at Juvenile and Family section, Pathumtani Provincial Court assigned youth offenders who met the inclusion criteria into two groups according to the severity of criminal case and their family support. If youth offender had parents or guardians concern for their youth to quit smoking or the criminal case was not severe, the judges would assign him/her to the voluntary group. After the order of judges, youth offenders were then arranged to have contact with the investigator. If they did not attend the pharmacist-based smoking cessation program within one week, the investigator tried to contact them again by telephone or mail, and if they did not come within 1 week after the second contact, they were excluded from the study. All youth offenders were invited to participate in this smoking cessation program at Thanyarak Institute. After both verbal and non-verbal descriptions of the study, youth offenders and their parents or guardians were provided with the consent forms. The youth offenders' demographic and smoking history data were recorded in the patient record forms. Then, all of them were interviewed and evaluated for the stages of readiness to quit smoking by using Transtheoretical Model. The nicotine dependence level was determined by using Fagerstrom Test for Nicotine Dependence and the reasons why they were still smoking obtained by using "why are you still smoking?" questionnaire. Evaluation of the baseline scores on Thai Smoking Cessation Health-Related Quality

of Life instrument, General knowledge of cigarette smoking test questionnaires, and withdrawal and Craving scale test were also performed. After they finished all documents, their target quit date was set and each of them was given 3 bottles of 240 ml sodum nitrate mouthwash to help them quit smoking.

Clinical practice guideline 2008 suggested psychosocial or cognitive behavioral therapies as a first-line therapies for youths. Pharmacotherapies were not recommended as a component of smoking cessation interventions for youths [13]. In this study, sodium nitrate mouthwash was given for initial period-usage after the quit date. Sodium nitrate mouthwash 15 ml was administered when feeling or wanting to smoke which made cigarettes' tasting changed when smoked. The primary outcomes were self-report of continuous abstinence rate (CAR) and the 7-day point prevalence abstinence rate (PAR), which were confirmed by the measurement of urine cotinine. The CAR was defined as no cigarette smoking, not even a puff since the target quit date. The PAR was defined as no cigarette smoking, not even a puff for the previous 7 days. Subjects who discontinued from the study or lost to follow-up were classified as smokers for the remainder of the study. All observed or self-reported adverse events during the treatment period were documented in the case report forms and counseling was given and followed up. The data of abstinence rate at the follow-up periods (weeks 2, 4, 8, 12, 16, and 24) after the target quit date were recorded in the follow-up visit record form.

Thai Smoking Cessation Health-Related Quality of Life instrument, and withdrawal and Craving scale test were obtained for the total of 6 follow-up visits (weeks 2, 4, 8, 12, 16, and 24).

General knowledge of cigarette smoking test questionnaires was also recoreded for 3 follow-up visits at week 2, 12, and 24 after the target quit date.

If youth offenders did not come to the clinic for follow-up, the investigator would contact them by telephone for 3 times within one week. If no response, the investigator would contact them by mail for 2 times. If still no response, the investigator would contact them again by telephone or mail. If no response again, they were classified as unable to quit smoking and the results were reported to the courts. Youth offenders who were contacted via telephone were asked about their cigarettes smoking and motivation to quit smoking (if they still smoked) and also helped them to maintain abstinence (if they could quit smoking). At the end of 24

weeks, the abstinent rates for individual subject in both groups were reported to the court. The diagram of the study procedure is shown in Figure 4

2.2 Laboratory Measurement

Urine collection was examined for cotinine at weeks 2, 4, 12, and 24 after the target quit date for verification of self-reported cessation. The EZ-step Smoke, a strip test of one step immunoassay, was used for the qualitative detection of cotinine in human urine at 200 ng/ml cut-off concentration. The positive of the test confirmed that youth still smoked and the negative result was for those who did not smoke.

2.3 Instruments/Measurements

2.3.1 Thai Smoking Cessation Health Related Quality of Life (TSCHRQOL)

Thai Smoking Cessation Health Related Quality of Life (TSCHRQOL) assessment instrument [43] (appendix F) contains 36 items. The instrument was designed to assess changes in HRQOL associated with smoking cessation and it was validated in 431 smokers and exsmokers, and had an overall coefficient alpha 0.93. The format and design of the instrument, including selection of response choices, were based on the five-point Likert scale. The instrument was administered to smokers and ex-smokers who would be requested to judge the perceived HRQOL during smoking cessation on two rating scales (i.e., a frequency scale: 1=none of the time, 2=a little of the time, 3=some of the time, 4=most of the time, and 5=all of the time; an evaluation scale: 1=not at all, 2=slightly, 3=moderately, 4=quite a bit, and 5=extremely). Summated rating scale was used to calculate the item scores of the instrument and subscales (i.e., positive statements: 1 = 0 points, 2 = 25 points, 3 = 50 points, 4 = 75 points, 5 = 100 points and negative statements: 1 = 100 points, 2 = 75 points, 3 = 50 points, 4 = 25 points, 5 = 0 points). The scores were calculated by adding the raw scores on each subscales/all items on all subscales and then dividing it by the total number of items for those subscales/all subscales. The scores ranged from 0 (i.e., worst HRQOL) to 100 (i.e., best HRQOL).

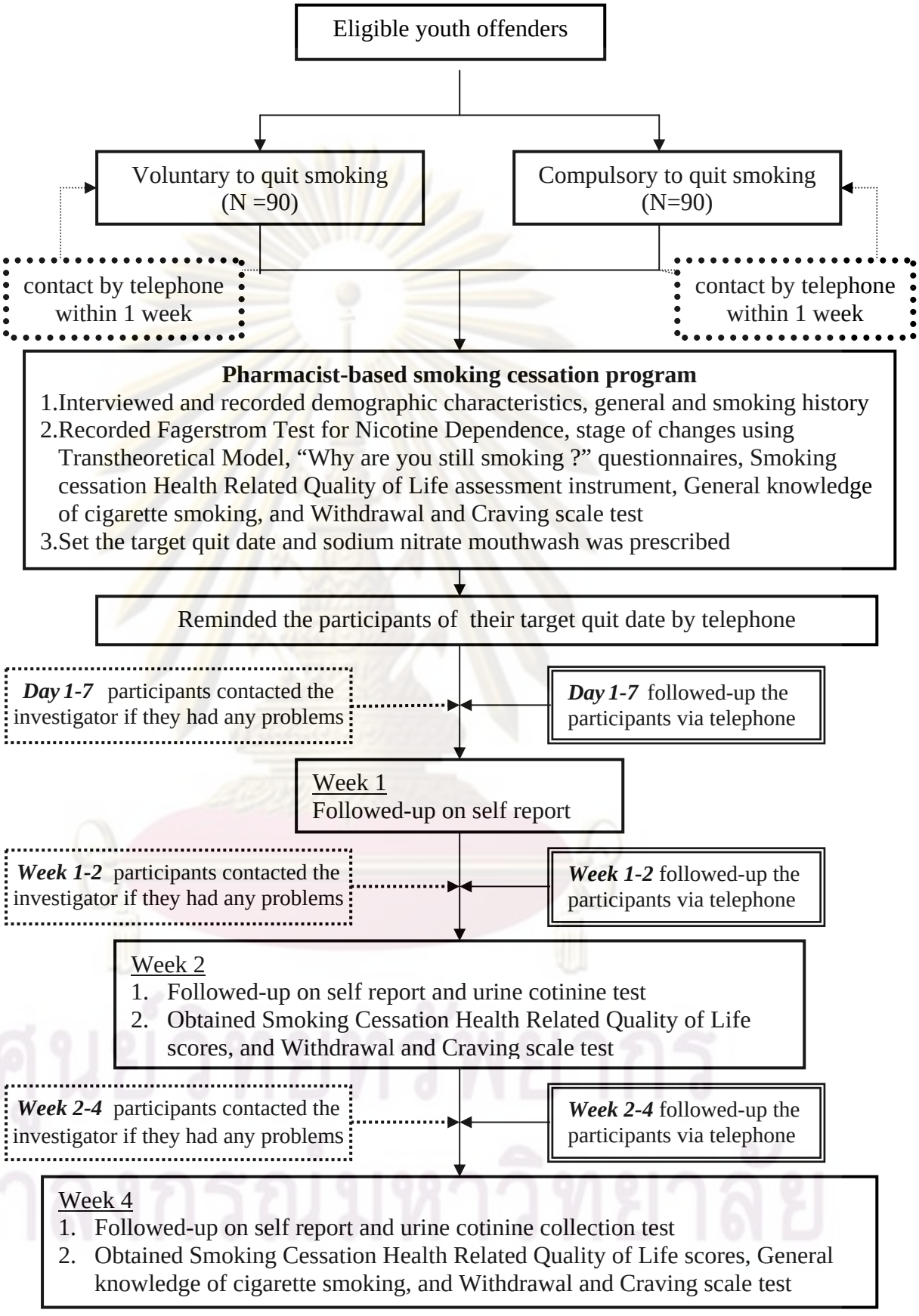


Figure 4 The diagram of the study procedure

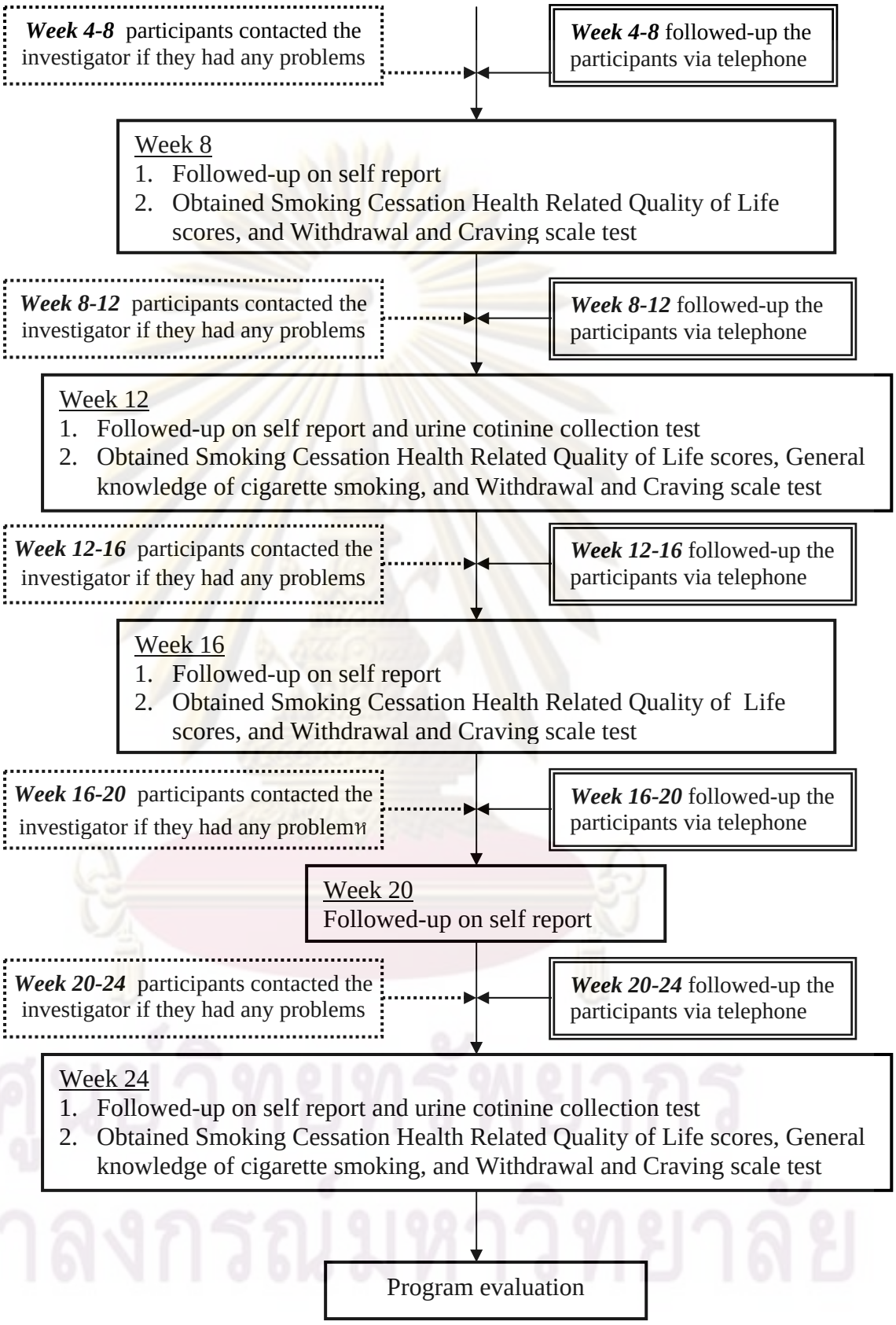


Figure 4 The diagram of the study procedure (*continued*)

The instrument consisted of four subscales: (1) general well being (18 items: items 1-18) with coefficient alpha 0.92, (2) satisfaction (8 items: item 19, 20, and 29-34) with coefficient alpha 0.88, (3) self-control (4 items: item 21, 22, 23, and 26) with coefficient alpha 0.88, and (4) mental and emotional problems (6 items: item 24, 25, 27, 28, 35, and 36) with coefficient alpha 0.83.

2.3.2 General knowledge of cigarette smoking test questionnaire

General knowledge of cigarette smoking test questionnaire (appendix G) was composed of 20 questions. The questions were tested for content validity by 4 smoking cessation experts (appendix L). Each item was reviewed for content, grammatical correctness, organization, readability, and clarity. The expert panel was also asked to suggest any additional items related to the test questions and/or to the general knowledge regarding cigarette smoking that should be included in the instrument. The answers were classified as: yes, no, or do not know. If a correct answer was chosen, the subject would receive 1 point. If an incorrect answer, or the answer of do not know was chosen, the subject would receive 0 point. A pilot test of this test questionnaire was carried out in 25 youth offenders for its reliability coefficient [i.e., Kuder-Richardson 20 formula (KR-20)], then adjusted and selected suitable items for usage in this research. The KR-20 of this test questionnaire was 0.881.

2.3.3 Withdrawal and Craving scale test

Withdrawal and Craving scale test (appendix H) was modified from the Minnesota Nicotine Withdrawal Scale (MNWS) and the Brief Questionnaire of Smoking Urges (QSU-Brief). The MNWS contained 9 items of response choices as Likert scale (i.e., 0=not at all, 1=slight, 2=moderate, 3=quite a bit and 4=extreme). The 9 items of the MNWS are as followed: urge to smoke (craving), depressed mood, irritability or frustration or anger, anxiety, difficulty concentrating, restlessness, increased appetite, difficulty going to sleep, and difficulty staying asleep [80, 81].

QSU-Brief contained 10 items, in which the response choices were 7-point Likert scale ranging from strongly disagree to strongly agree. It was divided into two factors from craving reports. Factor one of the QSU-Brief represented a desire and intention to smoke with perceived smoking as pleasure or rewarding (item 1, 3, 6, 7,

and 10), while factor two represented an anticipation of relief from negative effect with an urgent desire to smoke (item 4, 8, and 9) [82]. The items of QSU-Brief are as followed:

1. I have a desire for a cigarette right now.
2. Nothing would be better than smoking a cigarette right now.
3. If it were possible, I probably would smoke now.
4. I could control things better right now if I could smoke.
5. All I want right now is a cigarette.
6. I have an urge for a cigarette.
7. A cigarette would taste good now.
8. I would do almost anything for a cigarette now.
9. Smoking would make me less depressed.
10. I am going to smoke as soon as possible

2.4 Statistical Analysis

The statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) software, version 17.0. Intention to treat analysis was used in this study. Youth offenders who missed the follow-up visits for any reason were considered to fail to quit smoking. The level of significance was set at an $\alpha = 0.05$.

Descriptive statistics (e.g., mean, standard deviation, median, percentage, and frequency) were used to evaluate the baseline characteristics, smoking history and abstinence rates at follow-up periods.

Statistical comparisons between compulsory and voluntary groups for categorical variables were performed using Chi-square (χ^2) test or Fisher's exact test in the analysis of baseline characteristics, 7-day point prevalence abstinence rates and continuous abstinence rates at follow-up periods (i.e., weeks 2, 4, 8, 12, 16, and 24) after the target quit date. The odds ratio and the difference of abstinence rate variables between the 2 groups were compared using the χ^2 test. Continuous variables such as scores of health related quality of life, general knowledge of cigarette smoking, and withdrawal and craving scale between baseline and at the end of study for each group were compared by using independent *t*-test when data were

normal distribution or using Mann-Whitney U t-test when data were not normal distribution. Moreover, one-way repeated measure ANOVA was performed to compare scores of health related quality of life, and withdrawal and craving scale at baseline and follow-up periods at weeks 2, 4, 8, 12, 16, and 24 after the target quit date, and to compare scores of general knowledge of cigarette smoking at baseline and follow-up periods on weeks 4, 12, and 24 after the target quit date within compulsory and voluntary groups.

Univariate regression with a set of the level of significance at an $\alpha = 0.25$ was performed to determine the association between the number of cigarettes smoked per day (i.e., dependent variable) and independent factors such as gender, age, educational level, daily income or allowance, alcohol consumption, age started smoking, number of year smoked, a period of watching television per day, monthly income, marital status of parents and environmental factors such as the number of smokers living in the house, number of smokers in friends' group. The associated independent factors were selected to analyse with multiple regression and made equation by backward stepwise regression method.

Costs of a pharmacist-based smoking cessation program was calculated as followed:

Costs of the program = Pharmacist's wages + Documentary expenses

Pharmacist's wages = Pharmacist's working time x mean salary per minute

CHAPTER IV

RESULTS AND DISCUSSION

This study recruited the youth offenders at Juvenile and Family Section, Pathumtani Provincial Court from January 1, 2008 to September 30, 2008, and were followed-up until March 15, 2009. All youth offenders were educated and counseled regarding tobacco cessation by a clinical pharmacist (the investigator) through a pharmacist-based smoking cessation program at Thanyarak Institute. This chapter is divided into 4 parts:

1. Baseline characteristics: baseline characteristics of youth offenders, their parents characteristics, and smoking history.
2. Evaluation of the effectiveness of a pharmacist-based smoking cessation program in terms of self-report of continuous abstinence rate (CAR) and the 7-day point prevalence abstinence rate (PAR), confirmed by the measurement of urine cotinine, changes in the health related quality of life during smoking cessation, changes in general knowledge of cigarette smoking, and changes in nicotine withdrawal and craving scores between compulsory and voluntary methods.
3. Factors associated with the number of cigarettes smoked per day in youth offenders.
4. Costs of the development and implementation of a pharmacist-based smoking cessation program for youth offenders.

1. Baseline characteristics

1.1 Baseline characteristics of youth offenders

Subjects were youth offenders who met the inclusion criteria and had willing to participate in the study. Figure 5 depicts the flow diagram of participants disposition throughout the study. Of 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, 7 of them lost to follow-up and 6 withdrew from rehabilitation at the Juvenile Observation and Protection Center. In the control group, 6 of them lost to follow-up and 2 withdrew from rehabilitation at the Juvenile Observation and Protection Center.

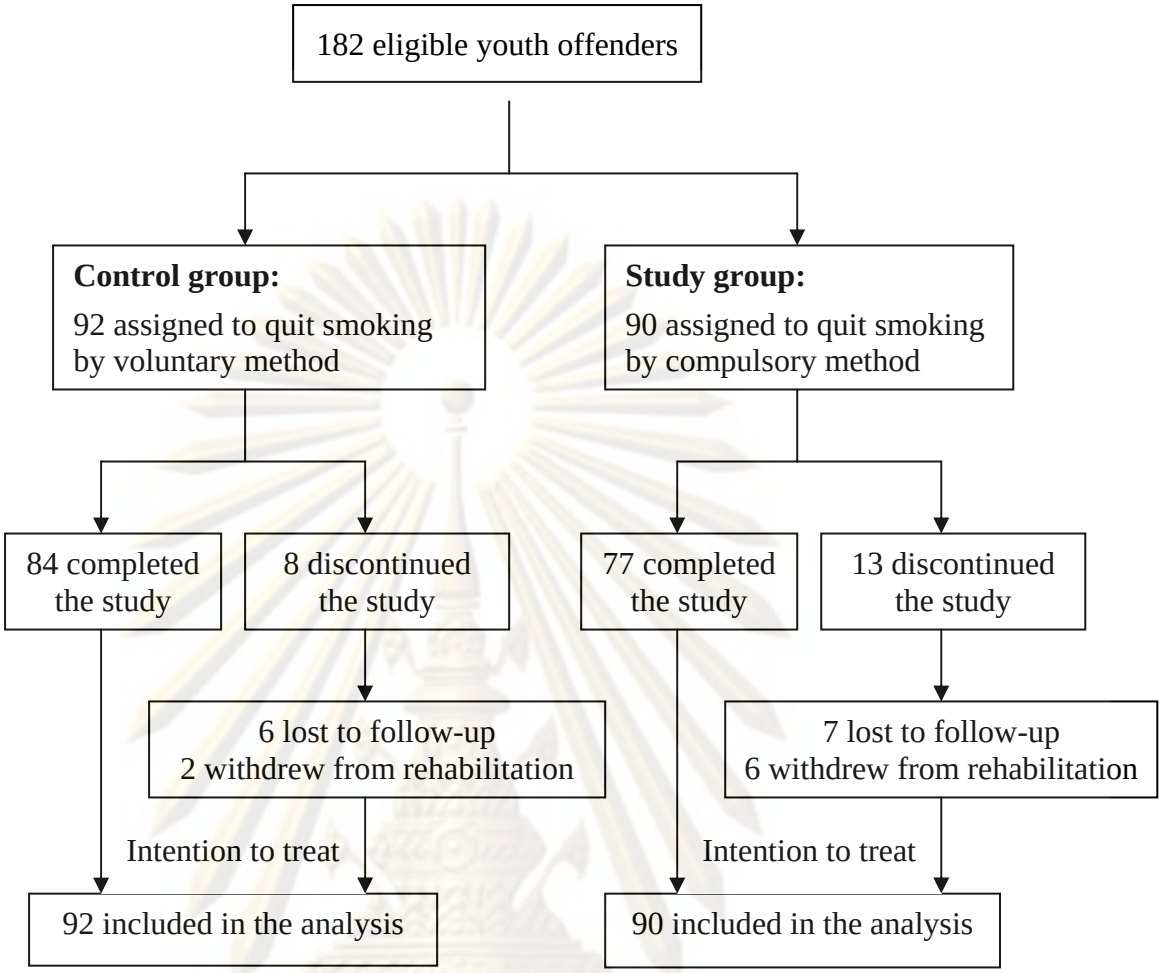


Figure 5 Flow diagram of the participant disposition

The baseline characteristics data was shown in Table 4. They were not statistically significant difference between the study and the control groups (p>0.05). Most youths (96.7%) were male with the mean ± SD age of 16.72 ± 1.17 years (ranging from 14 to 18 years) which were similar to the statistics of the overall proportion of Thai male youth offenders (91%) with age between 15-18 years (84.50%) [83]

Table 4 Baseline characteristics of youth offenders

Data	No. of youths (%)			*p* value
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Gender				
- Male	90 (97.8)	86 (95.6)	176 (96.7)	0.441[b]
- Female	2 (2.2)	4 (4.4)	6 (3.3)	
Age[d]				
Mean ± SD (years)	16.87 ± 1.16	16.57 ± 1.16	16.72 ± 1.17	0.080[c]
Range	14-18	14-18	14-18	
- 14 years	3 (3.3)	5 (5.6)	8 (4.4)	
- 15 years	12 (13.0)	12 (13.4)	24 (13.2)	
- 16 years	14 (15.2)	22 (24.4)	36 (19.8)	0.264[a]
- 17 years	28 (30.4)	29 (32.2)	57 (31.3)	
- 18 years	35 (38.1)	22 (24.4)	57 (31.3)	
Offending case				
- Related to drug addiction	31 (33.7)	34 (37.8)	65 (35.7)	
- Against property	31 (33.7)	34 (37.8)	65 (35.7)	
- Related to sexual assault	6 (6.5)	4 (4.4)	10 (5.5)	0.474[a]
- Related to life/body injury	10 (10.9)	4 (4.4)	14 (7.7)	
- Related to traffic violation	2 (2.2)	0 (0.0)	2 (1.1)	
- Related to illegal gun	5 (5.4)	7 (7.8)	12 (6.6)	
- Related to copyright violation	7 (7.6)	7 (7.8)	14 (7.7)	
Sentences status				
- Restricted conduct	14 (15.2)	12 (13.3)	26 (14.3)	
- Restricted conduct and suspension of the determination of punishment	53 (57.6)	48 (53.4)	101 (55.5)	0.659[a]
- Restricted conduct and infliction of punishment	25 (27.2)	30 (33.3)	55 (30.2)	

Table 4 Baseline characteristics of youth offenders *(continued)*

Data	No. of youths (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Educational level				
- Primary school	29 (31.5)	23 (25.5)	52 (28.6)	0.259
- Junior high school	41 (44.6)	51 (56.7)	92 (50.5)	
- Senior high school	22 (23.9)	16 (17.8)	38 (20.9)	
Living status				
- Live with others (not father and/or mother)	22 (23.9)	23 (25.5)	45 (24.7)	
- Live with father only	10 (10.9)	7 (7.8)	17 (9.3)	0.201
- Live with mother only	22 (23.9)	12 (13.3)	34 (18.7)	
- Live with both father and mother	38 (41.3)	48 (53.4)	86 (47.3)	
Number of siblings				
Mean ± SD (persons)	1.53 ± 1.21	1.56 ± 1.29	1.54 ± 1.25	0.902[c]
Range	0-6	0-7	0-7	
- 0	16 (17.4)	15 (16.6)	31 (17.0)	
- 1	38 (41.3)	36 (40.0)	74 (40.7)	
- 2	19 (20.7)	26 (28.9)	45 (24.7)	0.321
- 3	14 (15.2)	6 (6.7)	20 (11.0)	
- ≥4	5 (5.4)	7 (7.8)	12 (6.6)	
Birth order				
- first	45 (49.0)	41 (45.6)	86 (47.3)	0.761
- middle	20 (21.7)	18 (20.0)	38 (20.9)	
- last	27 (29.3)	31 (34.4)	58 (31.8)	
Working status				
- Yes	42 (45.7)	50 (55.6)	92 (50.5)	0.182
- No	50 (54.3)	40 (44.4)	90 (49.5)	

Table 4 Baseline characteristics of youth offenders *(continued)*

Data	No. of youths (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Daily income or allowance				
Mean ± SD (baht)	139.88±74.22	119.97±67.46	130.03±71.46	0.606[c]
Range	20-300	20-300	20-300	
- 1 – 50 baht	18 (19.6)	21 (23.3)	39 (21.5)	
- 51 – 100 baht	18 (19.6)	26 (28.9)	44 (24.2)	
- 101 – 150 baht	17 (18.5)	14 (15.6)	31 (17.0)	0.452
- 151 – 200 baht	26 (28.2)	21 (23.3)	47 (25.8)	
- ≥201 baht	13 (14.1)	8 (8.9)	21 (11.5)	
Underlying disease				
- None	80 (87.0)	78 (86.7)	158 (86.9)	
- Asthma	8 (8.6)	6 (6.7)	14 (7.7)	0.744
- Allergic rhinitis	2 (2.2)	1 (1.1)	3 (1.6)	
- Peptic ulcer	1 (1.1)	3 (3.3)	4 (2.2)	
- Others*	1 (1.1)	2 (2.2)	3 (1.6)	
Alcohol consumption				
- Never	37 (40.2)	30 (33.3)	67 (36.8)	0.591
- Occasional	48 (52.2)	51 (56.7)	99 (54.4)	
- ≥Once per week	7 (7.6)	9 (10.0)	16 (8.8)	

[a] using Chi-square test to compare the number of youth offenders in the control group with the study group

[b] using Fisher's exact test to compare the number of youth offenders in the control group with the study group

[c] using independent t-test to compare mean of the control group with the study group

[d] Mode = 18 and 17 years, Median = 17 and 17 years in the control, and study groups, respectively

* nasal tumor, heart disease, and anemia

The majority of the frequently occurred cases were offences related to drug addiction (35.7%) and offences against property (35.7%). There are several penal measures of varying degrees of seriousness under the Court decision, such as issuance of a warning, suspension of the determination of punishment, infliction of punishment, imposing restrictions on conduct (e.g., report to the correction officers or lay judges every 3 months and be tested for drug use, return to his/her education or occupation, prohibit against socializing with bad elements or hanging out in bars, night clubs, perform community service, or participate in the activities of youth camps, etc.) [84]. The most sentences status in this study were restricted conduct and suspension of the determination of punishment (55.5%).

It was clearly found that youth offenders were more likely to have poor educational performance, low educational levels and early school dropouts. Most youth offenders (50.5%) enrolled in junior high schools which was a compulsory education in Thailand. Employment of a young worker < 18 years of age is legal with many restrictions on the employment such as appropriate types of work and duration of time for their ages [85]. Half of them worked as employees at local factory, gas station, or worked as labourers. For the unemployees, some of them are in school, (i.e., age < 18 years). Daily income or allowance was different between working and non-working youth offenders ie. those who worked had higher income than those without work. The mean ± SD of daily income or allowance was 130.03 ± 71.46 baht (range 20-300). Forty seven percents of them lived with both parents and 24.7% lived with other persons e.g., relatives, employers, and friends. This finding is consistent with the statistics of the Thai youth offenders lived with their parents (47.91%) [83]. Generally, their family was small consisted of only 1 or 2 siblings, mean ± SD number of siblings in their family was 1.54 ± 1.25 (range 0-7). Eighty seven percents did not have any underlying diseases. The most underlying disease reported was asthma (7.7%), which might be worse by their smoking behavior [86]. Establishing smoking cessation program is one strategy to help youth offenders free from detrimental consequences of tobacco smoking. More than a half of youth offenders (63.2%) consumed alcohol. This statistics correspond with the previous studies which reported 65.5% of youths in Juvenile Observation and Protection Centre used to drink alcoholic beverages [87]. Most of them consumed alcohol for social purposes (54.4%), which was higher than the rate reported for the general youths (33%) [87].

This is alarming because it can lead them to other illicit drug use in the future [88] and very difficult for them to quit smoking [89].

Knowing of parental characteristics can help understanding youth smoking behavior. The parental problems may influence youths to try smoking and/or make wrong decision [90]. Table 5 demonstrates demographic data of youth offender's parents which were not significantly different between the control and the study groups (all $p>0.05$). Overall, the majority of the parents were more likely to have moderate to low socioeconomic status. Most of their parents have low educational level (primary school 83.5%) and only 3.3% of their parents were graduated with bachelor's degree or higher. Forty eight percent of parents were living together and 31.8% were separated or divorced. Castrucci et al. reported that parents who separated or divorced could lead their children to smoke cigarettes [90]. Most parents were employee (father: 51.1%, mother: 47.8%) and some youth offenders (23.6%) did not know their parents' occupations because the parents never contact them. Most parents or guardians had low income. The majority had a monthly income under 10,000 baht (62.6%) and only 7.7% of the family reported a monthly income above 20,000 baht. The mean ± SD monthly income of youth offenders' family was 11,218.24 ± 6,398.78 baht (range 2,000-36,000; median = 10,000). Soteriades et al. found that parents with low incomes and low educational levels were more likely to have youths smoke cigarettes [91].

Table 5 Baseline characteristics of youth offender's parents

Data	No. of parents (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Educational level				
- Primary school	79 (85.8)	73 (81.1)	152 (83.5)	0.556
- High school	10 (10.9)	14 (15.6)	24 (13.2)	
- ≥Bachelor's degree	3 (3.3)	3 (3.3)	6 (3.3)	
Marital status				
- Living together	40 (43.5)	48 (53.4)	88 (48.4)	0.202
- Separate	30 (32.6)	28 (31.1)	58 (31.8)	
- Father died	14 (15.2)	11 (12.2)	25 (13.7)	
- Mother died	7 (7.6)	1 (1.1)	8 (4.4)	
- Both father and mother died	1 (1.1)	2 (2.2)	3 (1.7)	
Father's occupation				
- Employee	46 (50.0)	47 (52.2)	93 (51.1)	0.724
- Self employment	6 (6.5)	9 (10.0)	15 (8.2)	
- Farmer	5 (5.4)	3 (3.3)	8 (4.4)	
- Government officer	4 (4.4)	5 (5.6)	9 (4.9)	
- None	0 (0.0)	1 (1.1)	1 (0.6)	
- Others*	31 (33.7)	25 (27.8)	56 (30.8)	
Mother's occupation				
- Employee	40 (43.5)	47 (52.2)	87 (47.8)	0.421
- Self employment	22 (23.9)	16 (17.8)	38 (20.9)	
- Farmer	5 (5.4)	2 (2.2)	7 (3.8)	
- Government officer	2 (2.2)	0 (0.0)	2 (1.1)	
- None	10 (10.9)	12 (13.3)	22 (12.1)	
- Others*	13 (14.1)	13 (14.5)	26 (14.3)	

Table 5 Baseline characteristics of youth offender's parents *(continued)*

Data	No. of parents (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Monthly income[c]				
Mean ± SD (baht)	10,431.74 ± 5,889.92	12,022.22 ± 6,819.47	11,218.24 ± 6,398.78	0.094[b]
Range	2,000-30,000	2,000-36,000	2,000-36,000	
- 1-5,000 baht	11 (12.0)	11 (12.2)	22 (12.1)	
- 5,001-10,000 baht	52 (56.6)	40 (44.4)	92 (50.5)	
- 10,001-15,000 baht	15 (16.3)	17 (18.9)	32 (17.6)	0.464
- 15,001-20,000 baht	8 (8.6)	14 (15.6)	22 (12.1)	
- >20,001 baht	6 (6.5)	8 (8.9)	14 (7.7)	

[a] using Chi-square test to compare the number of youth offenders in the control group with the study group

[b] using independent t-test to compare mean of the control group with the study group

[c] median = 9,000 and 10,000 baht in the control and study groups, respectively

* do not know or dead

1.2 Smoking history

Table 6 presents the baseline of youth offender's smoking history which were not significantly different between the control and the study groups (p>0.05), except for the stage of change in Transtheoretical Model. They smoked for an average of 7.69 ± 4.62 cigarettes/day (range 2-20) which is consistent with Sussman's study: reviewed of 66 smoking cessation intervention studies, and an approximate mean of cigarettes smoked/day was 8.4 [77] and also consistent with the study of Jantarapaijit that 50.7% of Thai high school youths smoked < 5 cigarettes/day [92].

Our study revealed that participants smoked their first cigarette at mean ± SD age of 14.31 ± 1.67 years old (range 7-17) and became daily cigarette smoking for 2.53 ± 1.59 years (range 1-11). Most of them smoked Thai brand cigarettes [i.e., Krong-Thip (77.5%)]. Although Thai law prohibits children under 18 from buying cigarettes or tobacco products, youth offenders could buy cigarettes by themselves. Most of them (74.1%) bought cigarettes in a split packet (e.g., 3-4 cigarettes/10 baht) because they did not have enough money to buy a whole packet. They spent for cigarettes 20.12 ± 11.59 baht/day (range 0-52). Alarmingly, we found that some of them (3.3%) did not buy their own cigarettes but they had cigarettes from adult smokers in their family, friends, or co-workers.

About 58% of youth offenders had smokers in their house [e.g., father (33.0%), mother (3.3%), brothers (20.9%), or other relatives (19.2%)]. While family smoking behavior has been demonstrated to be a factor related to the onset of youth smoking, several studies suggest that the strongest factor for them to start smoking was friends [91, 93-95]. Most youth offenders (97.8%) had friends who were smokers and the mean ± SD number of smokers in their friends' group was 7.10 ± 4.32 (range 0-20). Kleinjan et al. found that the presence of other smokers in the family and/or friends'group was a predictor of poor smoking cessation outcome [96]. This finding implied that smoking cessation intervention should be more concerned if there were any smokers in their family and/or friends'group.

Aldous J.[40] demonstrated that youths who viewed actors smoking in movies or television were increased risk of becoming daily smokers. In this study, most of youths (90.7%) spent time on watching television for 3.52 ± 2.22 hours/day (range 0-10).

Table 6 Baseline of youth offenders' smoking history

Data	No. of youths (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Age started smoking				
Mean ± SD (years)	14.51 ± 1.75	14.10 ± 1.49	14.31 ± 1.67	0.090[b]
Range	7-17	9-17	7-17	
- ≤11 years	5 (5.4)	2 (2.2)	7 (3.8)	0.120
- 12-13 years	18 (19.6)	29 (32.2)	47 (25.8)	
- 14-15 years	44 (47.8)	43 (47.8)	87 (47.8)	
- ≥16 years	25 (27.2)	16 (17.8)	41 (22.6)	
Number of cigarettes per day				
Mean ± SD	7.42 ± 4.88	7.97 ± 4.35	7.69 ± 4.62	0.429[b]
Range	2-20	2-20	2-20	
- 1-5	48 (52.2)	35 (38.9)	83 (45.6)	0.232
- 6-10	33 (35.9)	45 (50.0)	78 (42.9)	
- 11-15	3 (3.3)	4 (4.4)	7 (3.8)	
- 16-20	8 (8.6)	6 (6.7)	14 (7.7)	
Number of years smoked				
Mean ± SD (years)	2.43 ± 1.67	2.63 ± 1.51	2.53 ± 1.59	0.402[b]
Range	1-11	1-8	1-11	
- 1	28 (30.4)	22 (24.4)	50 (27.4)	0.615
- 2	29 (31.5)	28 (31.0)	57 (31.3)	
- 3	21 (22.9)	20 (22.3)	41 (22.6)	
- ≥4	14 (15.2)	20 (22.3)	34 (18.7)	
Cigarette's brand				
- Krong-Thip	76 (82.6)	65 (72.3)	141 (77.5)	0.231
- Sai-Fon	4 (4.4)	11 (12.2)	15 (8.2)	
- L&M	9 (9.7)	11 (12.2)	20 (11.0)	
- Others**	3 (3.3)	3 (3.3)	6 (3.3)	

Table 6 Baseline of youth offenders' smoking history *(continued)*

Data	No. of youths (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Method of gaining cigarettes				
- Begging (not buying)	4 (4.4)	2 (2.2)	6 (3.3)	0.628
- Buy a split packet	69 (74.9)	66 (73.4)	135 (74.1)	
- Buy a whole packet	19 (20.7)	22 (24.4)	41 (22.6)	
Cost of cigarettes per day				
Mean ± SD (baht)	19.48 ± 11.76	20.78 ± 11.43	20.12 ± 11.59	0.451[b]
Range	0-52	0-52	0-52	
- 0-20 baht	56 (61.0)	52 (57.8)	108 (59.4)	0.842
- 21-40 baht	27 (29.3)	30 (33.3)	57 (31.3)	
- >41 baht	9 (9.7)	8 (8.9)	17 (9.3)	
Number of smokers at home				
Mean ± SD (persons)	0.82 ± 0.93	0.97 ± 1.02	0.89 ± 0.97	0.296[b]
Range	0-4	0-5	0-5	
- None	42 (45.7)	34 (37.8)	76 (41.8)	0.741
- 1	31 (33.7)	34 (37.8)	65 (35.7)	
- 2	14 (15.2)	17 (18.8)	31 (17.0)	
- ≥3	5 (5.4)	5 (5.6)	10 (5.5)	
Number of smokers in friends' group				
Mean ± SD (persons)	6.86 ± 4.19	7.34 ± 4.45	7.10 ± 4.32	0.449[b]
Range	0-20	0-20	0-20	
- None	2 (2.2)	2 (2.2)	4 (2.2)	0.987
- 1-4	26 (28.2)	24 (26.7)	50 (27.5)	
- 5-8	34 (37.1)	31 (34.4)	65 (35.7)	
- 9-12	22 (23.9)	24 (26.7)	46 (25.3)	
- ≥13	8 (8.6)	9 (10.0)	17 (9.3)	

Table 6 Baseline of youth offender smoking history in categorical data *(continued)*

Data	No. of youths (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Watching television/day				
Mean ± SD (hours)	3.35 ± 2.09	3.69 ± 2.35	3.52 ± 2.22	0.302[b]
Range	0-10	0-10	0-10	
- No	10 (10.9)	7 (7.8)	17 (9.3)	
- 1-4 hours	60 (65.2)	55 (61.2)	115 (63.3)	0.486
- ≥5 hours	22 (23.9)	28 (31.0)	50 (27.4)	
Fagerstrom (FTND) scores				
Mean ± SD (scores)	2.77 ± 2.01	2.49 ± 1.43	2.63 ± 1.75	0.277[b]
Range	0-9	1-7	0-9	
- 0-3 (low)	63 (68.4)	70 (77.8)	133 (73.1)	
- 4-6 (medium)	25 (27.2)	19 (21.1)	44 (24.2)	0.227
- 7-10 (high)	4 (4.4)	1 (1.1)	5 (2.7)	
Transtheoretical model				
- Precontemplation stage	0 (0.0)	29 (32.2)	29 (15.9)	
- Contemplation stage	25 (27.2)	27 (30.0)	52 (28.6)	<0.001*
- Preparation stage	53 (57.6)	28 (31.1)	81 (44.5)	
- Action stage	14 (15.2)	6 (6.7)	20 (11.0)	
Why are you still smoking ?				
Mean ± SD (scores) / Range				
- Nicotine effects	1.53 ± 1.35	1.40 ± 1.17	1.47 ± 1.26	0.479[b]
	0-5	0-4	0-5	
- Psychological effects	1.96 ± 1.36	2.14 ± 1.18	2.05 ± 1.27	0.320[b]
	0-5	0-5	0-5	
- Socio-cultural or habit effects	1.75 ± 1.03	1.94 ± 1.13	1.85 ± 1.08	0.226[b]
	0-5	0-5	0-5	

[a] using Chi-square test to compare the number of youth offenders in the control group with the study group

[b] using independent t-test to compare mean of the control group with the study group

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

** Marlboro, Wonder, Pall Mall, Garem

Participants had a mean Fagerstrom Test for Nicotine Dependence (FTND) scores of 2.63 ± 1.75 (range 0-9), indicating of low nicotine dependence. This result was consistent with the assessment of "why are you still smoking?"questionnaire of which the total scores showed that psychological and socio-cultural effects were the strongest effects of their smoking dependence rather than the nicotine effects. According to the Transtheoretical model (TTM), the stage of change in the control group of this study was found as followed: contemplation (27.2%), preparation (57.6%), and action (15.2%). Contemplation is the stage that smokers intend to quit smoking in the next month but had not tried to quit in the last 12 months. Preparation is the stage that smokers intend to quit in the next month and had tried to quit at least one time in the last 12 months or had made small behavioral changes. Action is the stage that smoker is successfully quit for at least 24 hours until 6 months. In contrast, youth offenders in the study group had stage of change significantly different from the control group ($p<0.001$) as followed: precontemplation (32.2%), contemplation (30.0%), and preparation (31.1%). Precontemplation is the stage that smokers intend to quit in the next 6 months, but had no definite plan. Because one-third of youth offenders in the study group were not voluntary or willing to quit smoking, it was more difficult to motivate them to quit than those of the control group.

Table 7 presents the data on the previous quit attempts which were not significantly different between the control and the study groups (all $p>0.05$). The analysis of p value included the youth offenders who did not have quit attempt. Most youth offenders (80.8%) had the history of previous quit attempts, and only 19.2% never tried to quit. A mean number ± SD of quit attempts was 1.67 ± 1.59 (range 0-10). Fifty eight percent of youth offenders tried to quit smoking 1 or 2 times. A mean of the longest quitting period was 24.38 ± 56.37 days (range 0-365 days, median = 7 days) and there were only 12.1% had abstinence > 1 month. The most quitting method (59.9%) used in this study was cold turkey (willpower) which had low success rate and only 3.3% used pharmacotherapy for their smoking cessation such as nicotine replacement therapy (NRTs) or sodium nitrate mouthwash. Other effective methods such as behavioral counseling together with pharmacotherapy may be appropriate and approached for this youth offenders to increase the abstinence rate.

Table 7 Characteristics of previous quit attempts of youth offenders

Data	No. of youths (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
No previous quit attempt	14 (15.2)	21 (23.3)	35 (19.2)	
Number of previous quit attempts				
Mean ± SD (times)	1.77 ± 1.76	1.57 ± 1.42	1.67 ± 1.59	0.387[b]
Range	0-10	0-6	0-10	
- 1	44 (47.8)	32 (35.6)	76 (41.8)	
- 2	13 (14.1)	18 (20.0)	31 (17.0)	0.607
- ≥3	21 (22.9)	19 (21.1)	40 (22.0)	
Longest previous quitting period[c]				
Mean ± SD (days)	22.25 ± 45.14	26.57 ± 66.11	24.38 ± 56.37	0.479[b]
Range	0-365	0-365	0-365	
- 1-15 days	48 (52.2)	46 (51.1)	94 (51.7)	
- 16-30 days	19 (20.7)	12 (13.4)	31 (17.0)	0.391
- >31 days	11 (11.9)	11 (12.2)	22 (12.1)	
Method of quitting				
- Cold turkey method	56 (60.8)	53 (58.9)	109 (59.9)	0.453
- Step down	18 (19.6)	14 (15.6)	32 (17.6)	
- Pharmacotherapies	4 (4.4)	2 (2.2)	6 (3.3)	
Reason for quitting				
- Desire to quit	56 (60.8)	48 (53.3)	104 (57.2)	
- Family and school influence	9 (9.9)	12 (13.4)	21 (11.6)	
- Illness	11 (11.9)	6 (6.7)	17 (9.3)	0.517
- Religion ordination	1 (1.1)	2 (2.2)	3 (1.6)	
- Juvenile Observation and Protection Center rules	1 (1.1)	1 (1.1)	2 (1.1)	

Table 7 Characteristics of previous quit attempts of youth offenders *(continued)*

Data	No. of youths (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Reason for return to smoking				
- Craving	65 (70.6)	57 (63.4)	122 (67.1)	
- Stress	8 (8.7)	8 (8.9)	16 (8.8)	0.717
- Bored	3 (3.3)	2 (2.2)	5 (2.7)	
- Alcohol consumption	2 (2.2)	2 (2.2)	4 (2.2)	

[a] using Chi-square test to compare the number of youth offenders in the control group with the study group (youth offenders who did not have quit attempt were included in every analysis of *p* value)

[b] using independent t-test to compare mean of the control group with the study group

[c] median = 6 and 7 days in the control and study group, respectively

The most reasons to quit smoking was a desire to quit (57.2%) because of bordom, feeling that most people dislike smokers, or not having enough money to buy cigarettes. Forcing to quit by family and school (11.6%) was successful at the beginning but unsustainable due to loss of follow-up. Many youth offenders frequently returned to smoking by hiding their behavior from their parents and teachers. The majority returned to smoking due to cigarette craving (67.1%) (i.e., seeing or smelling cigarettes induced their desire to smoking). Minor reasons were stress (8.8%), bore (2.7%), and alcohol consumption (2.2%). It is essential for healthcare professionals to know the reasons for quit smoking and relapse of the smokers in order to develop or select the appropriate interventions to correct their previous mistakes and roadblocks in smoking cessation and can help them quit smoking successfully for their next attempts.

Table 8 shows factors induced youths to start smoking. This study allowed youth offenders to choose more than 1 of the factors which associated with their smoking. The factors were divided into,intrinsic, and extrinsic factors. The intrinsic factors or psychological factors were factors involved in themselves. The extrinsic or social factors were factors involved in their environment. Most of the intrinsic factors which induced youth offenders to start smoking were self-experiment (81.9%), and stress (51.5%). It is consistent with the study of Jantarapaijit which showed that the factors induced Thai high school youths in Chiang Mai to begin smoking was they just wanted to try and to know the feeling after smoking [92]. Most of the extrinsic factors was persuasion by their friends (54.9%). The results correspond with the survey study of Ruangkanchanasetr et al. in Bangkok which suggested that peer influence may motivate youths to start smoking [87].

There was significantly different between the control and the study groups in factor “for smart” (p=0.029). Twenty two youth offenders in the study group thought smoking cigarettes made them look smart and more attractive. The data of intrinsic and extrinsic factors induced youths to start smoking were collected because it was important for the counselors to know about youths’ attitudes toward smoking and could help them stop smoking easier. Although there are a number of policies in tobacco control and prevention, the concepts do not aim to change the attitudes toward smoking. A good way to change beliefs and attitudes toward smoking should begin since they were children. A guideline for the initial management of common risk behaviors in youths should be given to parents and/or teachers with the objectives to empower and support them to become the resourceful persons. If youths have been taken care warmly since they were children, most of them would not try or involve in bad situations or drug dependence [87].

Table 8 Factors induced youth offenders to start smoking

Data[a]	No. of youths (%)			*p* value[b]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Intrinsic factors				
- Self-experiment	73 (79.3)	76 (84.4)	149 (81.9)	0.372
- For entertaining	13 (14.1)	23 (25.5)	36 (19.8)	0.053
- For smart	11 (12.0)	22 (24.4)	33 (18.1)	0.029*
- Disappointed in love	10 (10.9)	13 (14.5)	23 (12.6)	0.468
- Disappointed in study	5 (5.4)	6 (6.7)	11 (6.0)	0.727
- Lack of concentration	4 (4.4)	4 (4.4)	8 (4.4)	0.975
- Lack of self-confidence	11 (12.0)	11 (12.2)	22 (12.1)	0.956
- Stress	51 (55.4)	50 (55.6)	101 (55.5)	0.987
- Shyness	7 (7.6)	9 (10.0)	16 (8.8)	0.569
Extrinsic factors				
- Friend persuasion	50 (54.3)	50 (55.6)	100 (54.9)	0.870
- Smoker in family	4 (4.4)	5 (5.6)	9 (4.9)	0.707
- Relatives are smokers	11 (12.0)	7 (7.8)	18 (9.9)	0.345
- Other adult smokers	10 (10.9)	14 (15.6)	24 (13.2)	0.350
- Actors/actresses	0 (0.0)	1 (1.1)	1 (0.6)	0.311
- Movies	2 (2.2)	4 (4.4)	6 (3.3)	0.391
- Friends' acceptation	17 (18.5)	22 (24.4)	39 (21.4)	0.327
- Maturity image	11 (12.0)	10 (11.1)	21 (11.6)	0.858

[a] each youth offender could choose more than 1 factor of intrinsic factors and extrinsic factors, therefore, the total percentage of either intrinsic factors or extrinsic factors exceeds 100% (This percents were calculated from a number of youth offenders who chose by each item)

[b] using Chi-square test to compare the number of youth offenders in the control group with the study group

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

Table 9 shows attitudes of youth offenders or how they think about tobacco-control laws. Most of them (58.8%) agreed with warning labels on a cigarette's case because pictures and texts made them rethink about dangers of cigarette smoking. However, this fearful feeling occurred at only the initial period. Youth offenders, who smoke frequently, may be ignorant to see this warning labels. Most of them smoked a few cigarettes per day and could not afford to buy a whole case of cigarettes, therefore, it might be not possible for them to see the warning label on the cigarette case.

Though in Thailand, there is a law prohibit any stores from showing or advertising cigarettes for sale, smokers know where to buy cigarettes. Most of youth offenders (61.5%) disagreed with this law because they were still able to buy cigarettes from many regular/retail stores even they were under 18 years old. Supawongse et al. found that 96.7% of stores or sellers sold cigarettes to youths under 18 years old [41]. Therefore, to prevent youths from buying cigarettes and becoming smokers, the tobacco control law must be enforced rigorously.

Table 9 Attitudes of youth offenders to tobacco-control laws

Data	No. of youths (%)			*p* value[a]
	Control group (N = 92)	Study group (N = 90)	Total (N = 182)	
Warning labels on a cigarette case				
- Agree	56 (60.8)	51 (56.7)	107 (58.8)	0.565
- Disagree	36 (39.2)	39 (43.3)	75 (41.2)	
Prohibit sellers from showing cigarettes in the store				
- Agree	37 (40.2)	33 (36.6)	70 (38.5)	0.623
- Disagree	55 (59.8)	57 (63.4)	112 (61.5)	

[a] using Chi-square test to compare the number of youth offenders in the control group with the study group

2. Evaluation of the effectiveness of a pharmacist-based smoking cessation program

At week 24, of 182 youth offenders, 21 were lost from the study (8 in the control group and 13 in the study group). Intention to treat analysis was performed to determine the efficacy of all youth offenders (92 from the control group and 90 from the study group). Table 10 shows number of youth offenders in each follow-up visit which were not significantly different between the control and the study groups (p>0.05) in all follow-up visits. There was no punishment for youth offenders in the control group if they did not come to follow-up with the smoking cessation program. In contrast to the control group, if those in the study group did not come to follow-up, they would be claimed as violators against on the condition of imposing restriction on conduct and may have been punished. Although compulsory method was never used in any smoking cessation program [36], it may suit youth offenders. If youth offenders were not forced to stop smoking, they would not have any willingness to quit smoking by themselves and perhaps most of them did not even think about quitting. At the end of 24 weeks, 50 youth offenders (55.6%) in the study group were counseled completely by face to face and 27 (30.0%) were counseled via telephone. In the control group, 5 of them (5.4%) were counseled completely by face to face and 79 (85.9%) were counseled via telephone. Youth offenders who were contacted via telephone were asked about their cigarettes smoking and motivation to quit smoking (if they're still smoking) or helped them to maintain smoking abstinence (if they could quit smoking). Besides counseling by face to face as scheduled, urine was collected for cotinine test at weeks 12 and 24 after the target quit date according to the appointment with the court that they had to report their behavior every 3 months.

Table 10 Number of youth offenders in each follow-up visit

Follow-up visits	No. of youths (%)						*p* value[a]
	Control group		Study group		Total		
	Face to face	telephone	Face to face	telephone	Face to face	telephone	
1st visit (week 0)	92 (100.0)		90 (100.0)		182 (100.0)		
2nd visit (week 2)	51 (55.5)	37 (40.2)	73 (81.1)	11 (12.2)	124 (68.1)	48 (26.4)	
	88 (95.7)		84 (93.3)		172 (94.5)		0.534[b]
3rd visit (week 4)	45 (48.9)	40 (43.5)	69 (76.7)	13 (14.4)	114 (62.7)	53 (29.1)	
	85 (92.4)		82 (91.1)		167 (91.8)		0.754
4th visit (week 8)	25 (27.2)	59 (64.1)	57 (63.3)	23 (25.6)	82 (45.1)	82 (45.1)	
	84 (91.3)		80 (88.9)		164 (90.2)		0.585
5th visit (week 12)	14 (15.2)	70 (76.1)	55 (61.1)	25 (27.8)	69 (38.0)	95 (52.2)	
	84 (91.3)		80 (88.9)		164 (90.2)		0.585
6th visit (week 16)	5 (5.4)	79 (85.9)	53 (58.9)	26 (28.8)	58 (31.9)	105(57.7)	
	84 (91.3)		79 (87.7)		163 (89.6)		0.437
7th visit (week 24)	5 (5.4)	79 (85.9)	50 (55.6)	27 (30.0)	55 (30.2)	106(58.2)	
	84 (91.3)		77 (85.6)		161 (88.5)		0.225

[a] using Chi-square test to compare the number of youth offenders in the control group with the study group

[b] using Fisher's exact test to compare the number of youth offenders in the control group with the study group

Abstinence rate

In this study, the abstinence rate was considered into 2 terms (i.e., continuous abstinence rate, and 7-day point prevalence abstinence rate). Quitting smoking was defined as youth offender did not smoke or even a puff in any of the follow-up phase which verified by a self-report and negative urine cotinine test. Abstinence data at weeks 2, 4, 8, 12, 16, and 24 after the target quit date were recorded. Abstinence rate was calculated as number of youth offenders who were able to quit smoking divided by number of all youth offenders in each group. Table 11 presents continuous abstinence rates and 7-day point prevalence abstinence rates in the control and the study group.

Table 11 Continuous abstinence rate (CAR) and 7-day point prevalence abstinence rate (PAR) in youth offenders

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 (week12)	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 (week16)	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 (week24)	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)

[a] using Chi-square test to compare the number of youth offenders in the control group with the study group

* having a statistically significant difference at α = 0.05

2.1.1 Continuous abstinence rate, CAR

From table 11, The continuous abstinence rate (CAR) in every follow-up visit in the control group was higher than the study group, however, it was not significantly different (p>0.05). The CAR in both groups was highest at week 2 follow-up, i.e. 11.1% for the study group and 18.5% for the control group (p=0.162). At week 4, CAR was 10.0% for the study group, and 14.1% for the control group (p=0.393). At week 8, CAR was 10.0% for the study group and 13.0% for the control group (p=0.521). At weeks, 12, 16, and 24, CAR was the same at 8.9% in the study group and 12.2% for the control group (p=0.499). Figure 6 shows graphical presentation of continuous abstinence rate.

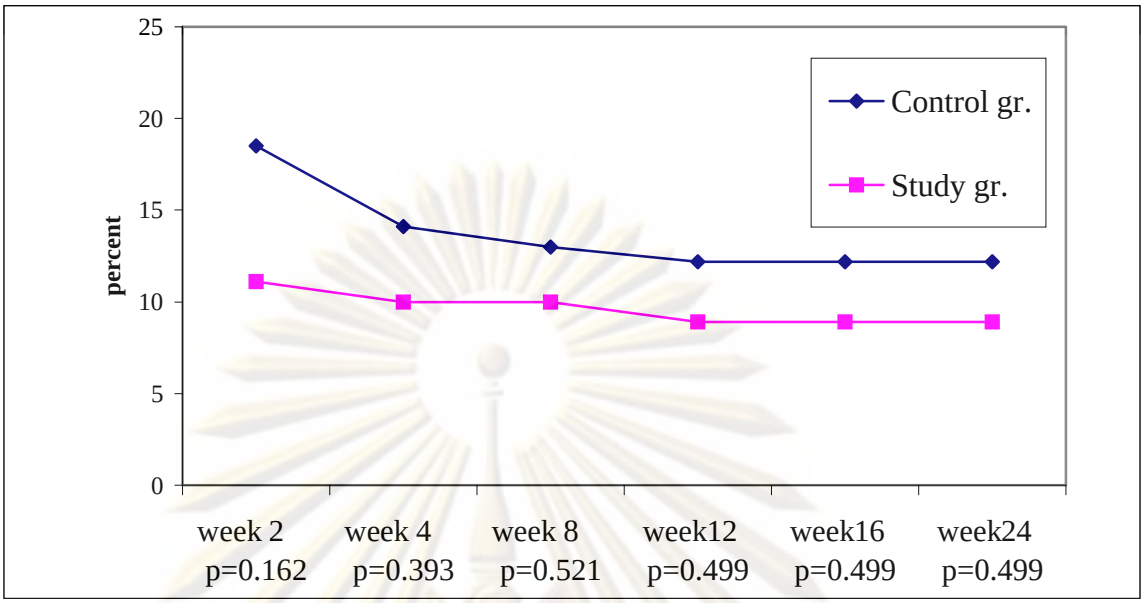


Figure 6 Continuous abstinence rate between control and study groups

2.1.2 Seven-day point prevalence abstinence rate, 7-day PAR

From table 11, there were significantly different in 7-day point prevalence abstinence rate (7-day PAR) between the control and the study groups at weeks 16 and 24 after the quit date. Similarly as CAR, 7-day PAR at initial follow-up visits in week 2 (18.5%) and week 4 (15.2%) in the control group were higher than the study group (11.1%, 12.2%) but not significantly different (p=0.162, 0.557, respectively). However, from weeks 8-24, the percentage of PAR in the study group was increased in every follow up visit and was higher than the control group. At weeks 8 and 12 the percentage of 7-day PAR in 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, 0.078, respectively). The percentage of 7-day PAR in 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, 24) and were significantly different (p=0.026, 0.002, respectively). From the above data, it shows that our pharmacist-based smoking cessation program could help youth offenders to stop smoking. However, the investigator did not continuously follow-up both groups after 24 weeks. Figure 7 shows graphical presentation of 7-day point prevalence abstinence rate.

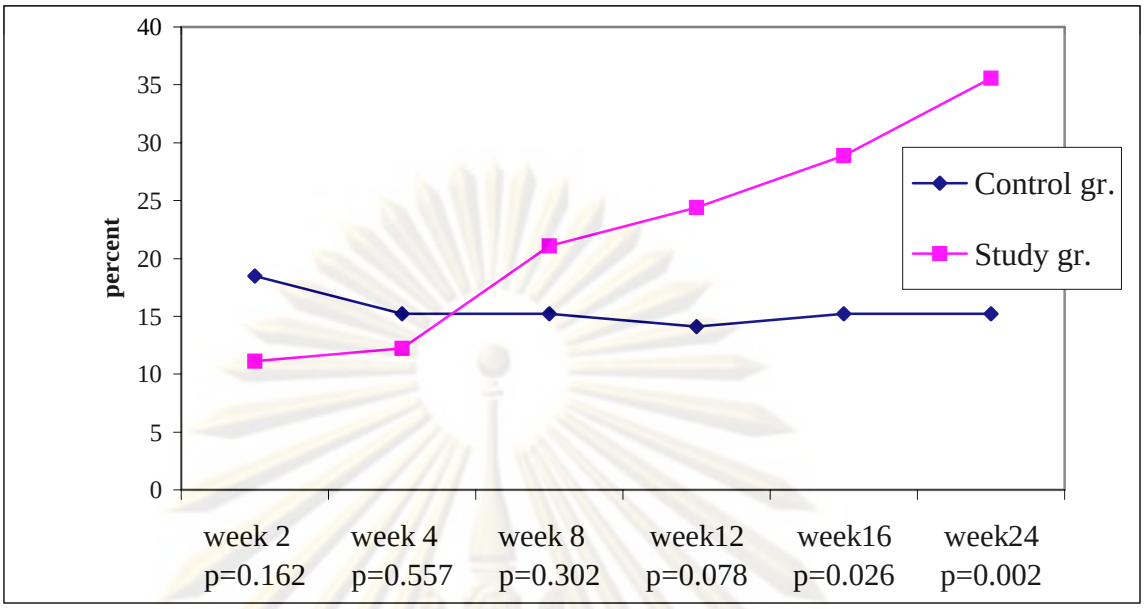


Figure 7 Seven-day point prevalence abstinence rate between control and study groups

One of the confounding variables that makes the abstinence rates different in this study was the willingness to quit attempt or the motivational level. Further analysis of the abstinence rates was performed based on the motivational level according to Transtheoretical model. Table 12 presents stages of change and 7-day PAR within the control and the study groups. At week 2, seventeen youth offenders (18.5%) in the control group were in the preparation and action stages according to Transtheoretical Model. They could quit smoking promptly when the investigator set the target quit date for them. Most youths in the study group were in the precontemplation (32.2%) and contemplation (30.0%) stages, it was very difficult to counsel them to quit smoking within 1-2 weeks after the first follow-up visit [45]. These youths could not quit smoking instantly but they gradually decreased their cigarettes and stopped smoking after the quit date. So, 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 smokers awareness of the available treatment options, having smokers identify their reasons for smoking and wanting to quit, identifying barriers to quit smoking, and using 5'R strategies [45] such as encourage them to think about why quitting is important to them. If they

could not quit smoking, they would face with a punishment. Counseling about risks of continuous smoking to their health and/or surrounding people and benefits of quitting, such as better health, enhance physical permanence, acuity of taste/smell and save money. If we could establish a future smoking cessation program, we would set more follow-up visits at the initial period to motivate youths, who were not ready to quit, to increase their willingness or decision 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 could quit smoking after 8 weeks whereas those in the control group, who were in the contemplation stage, could not. It showed that compulsory method may influence youth offenders who were not ready to quit because they may be afraid of the punishment if they still smoked. Furthermore, pharmacist intervention in youth offenders in the study group who completely attained in smoking cessation by this program may further motivate other youths, who were not ready to quit, to change the readiness to quit from precontemplation and contemplation stages to preparation and action stages.

Table 12 Seven-day point prevalence abstinence rate (PAR) and stages of change of youth offenders

Follow-up visits	Control group (%)				*p* value[a]	Study group (%)					*p* value[a]
	PAR	Stages of change				PAR	Stages of change				
		Contemplation	Preparation	Action			Precontemplation	Contemplation	Preparation	Action	
2nd visit (week 2)	17 (18.5)	0 (0.0)	11 (12.0)	6 (6.5)	0.005*	10 (11.1)	3 (3.3)	0 (0.0)	4 (4.4)	3 (3.3)	0.005*
3rd visit (week 4)	14 (15.2)	0 (0.0)	8 (8.7)	6 (6.7)	0.003*	11 (12.2)	2 (2.3)	0 (0.0)	5 (5.5)	4 (4.4)	<0.001*
4th visit (week 8)	14 (15.2)	0 (0.0)	8 (8.7)	6 (6.7)	0.003*	19 (21.1)	5 (5.5)	2 (2.3)	7 (7.7)	5 (5.5)	0.001*
5th visit (week 12)	13 (14.1)	0 (0.0)	7 (7.6)	6 (6.7)	0.002*	22 (24.4)	7 (7.7)	3 (3.3)	7 (7.7)	5 (5.5)	0.003*
6th visit (week 16)	14 (15.2)	0 (0.0)	8 (8.7)	6 (6.7)	0.003*	26 (28.9)	7 (7.7)	8 (8.9)	8 (8.9)	3 (3.3)	0.653
7th visit (week 24)	14 (15.2)	0 (0.0)	8 (8.7)	6 (6.7)	0.003*	32 (35.6)	10 (11.1)	8 (8.9)	10 (11.1)	4 (4.4)	0.397

[a] using Chi-square test to compare the number of youth offenders in each stages of change within the control group and the study group

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

Figure 8 and table 13 show number of cigarettes smoked per week, compared between baseline and each specified week within groups and compared between the control and the study groups. A number of cigarettes smoked per week was recorded from self report of youth offenders. A number of cigarettes smoked per week was significantly decreased from baseline to week 24 in both groups (p<0.001). At baseline, a mean number of cigarettes smoked per week was 55.92 ± 30.24 and 51.97 ± 34.12 in the study and the control groups, respectively. In week 24, a mean number of cigarettes smoked per week was 9.97 ± 13.27 and 27.70 ± 26.34 in the study and the control groups, respectively. When compare between the control and the study groups, it was found that a mean number of cigarettes smoked per week in the study group was significantly lower than the control group in every follow-up visit (p<0.001). It showed that compulsory method had more success in helping youth offenders to decrease a number of cigarettes smoked per week than voluntary method.

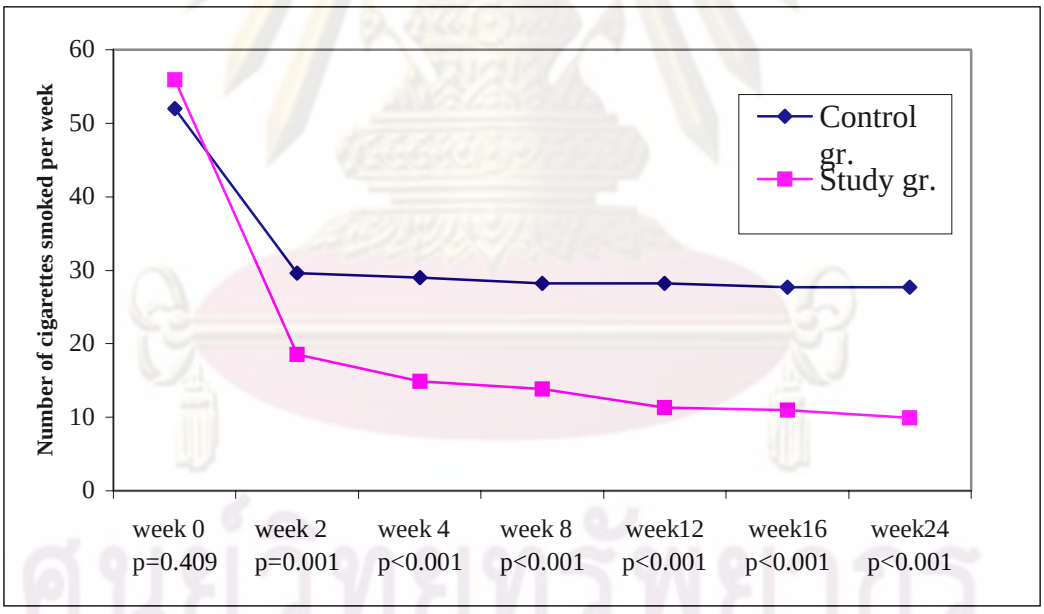


Figure 8 Number of cigarettes smoked per week

Table 13 Number of cigarettes smoked per week between week 0 and each specified week within group and between 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*	

[a] using paired t-test to compare mean at baseline (week 0) with at each follow-up visits (weeks 2, 4, 8, 12, 16, and 24)

[b] using independent t-test to compare mean of the control group with the study group

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

When compare abstinence rates between this study and the previous studies, it was found that the abstinence rate of this study was similar to other studies. Continuous abstinence rate and point prevalence abstinence rate of the study group in this study were 8.9% and 35.6%, respectively. Sussman reviewed 48 smoking cessation intervention studies and found that an overall continuous abstinence rate at time of follow-up had a mean of 11.5% (ranging from 0 to 41%) [77]. Hurt et al. conducted an open-label, uncontrolled study in 101 youths using nicotine patches and found that continuous abstinence rate at 6 months was 5% [29]. Killen et al. found that continuous abstinence rate at 6 months of nicotine patch plus bupropion (N=103) was 8% and nicotine patch only (N=108) was 7% [27]. For point prevalence abstinence rate, Moolchan et al. determined the efficacy of the nicotine patch and gum for voluntary adolescent, found that point prevalence abstinence rate at 6 months of the nicotine patch group (N=34) was 20.6 [73]. From data above, we can conclude that compulsory method in this study has an efficacy as same as the previous studies or may be higher. However, if the judges apply this method to force youth offenders to stop smoking in the future, they should set a regulation of certain punishment when youth offenders do not stop smoking or do not come to follow-up at the smoking cessation program. Youth offenders may fear punishment and may be able to increase more abstinence rate than this study.

It seemed that abstinence rate in the study group was better than the control group, but it was not enough power and sample size to detect a statistically significant difference between 2 groups. An estimated sample size in this study was calculated from data of a smoking cessation clinic at Thanyarak Institute from October 1, 2005 to September 30, 2006 which revealed that 330 voluntary youths had 9.69% of continuous abstinence rate in 6 months (N=32). There was no data about compulsory method so the investigator assumed that the differences of continuous abstinence rates between two groups were 18% approximately. From this reason, the sample size of this study may be too low to detect a significant difference of abstinence rate between the control and the study groups. Table 14 shows power of a test (1-β) and required number of youth offenders (N required) for finding a significant difference. Future study should use a required number of youth offenders for detecting a significant difference between the control and the study groups.

Table 14 Power of a test (1-β) and required number of youth offenders (N required)

Follow-up visits	CAR (%)		*p* value	PAR (%)		*p* value
	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)		17 (18.5)	10(11.1)	
1-β	28.53		0.162	28.53		0.162
N required/group	361			361		
3rd visit (week 4)	13 (14.1)	9 (10.0)		14 (15.2)	11 (12.2)	
1-β	12.92		0.393	8.69		0.704
N required/group	989			2,061		
4th visit (week 8)	12 (13.0)	9 (10.0)		14 (15.2)	19 (22.1)	
1-β	9.20		0.521	22.45		0.302
N required/group	1,774			500		
5th visit (week 12)	11 (12.2)	8 (8.9)		13 (14.1)	22 (24.4)	
1-β	10.64		0.499	42.74		0.078
N required/group	1,360			229		
6th visit (week 16)	11 (12.2)	8 (8.9)		14 (15.2)	26 (28.9)	
1-β	10.64		0.499	-		0.026*
N required/group	1,360			-		
7th visit (week 24)	11 (12.2)	8 (8.9)		14 (15.2)	32 (35.6)	
1-β	10.64		0.499	-		0.002*
N required/group	1,360			-		

* having a statistically significant difference at α = 0.05

Health related quality of life

Smoking cessation is beneficial for health and increases quality of life of smokers. Those who smoke more cigarettes, may have more nicotine dependence and have more nicotine withdrawal symptoms when they quit smoking. Both nicotine dependence and nicotine withdrawal symptoms can affect smokers' quality of life. In addition, effects of nicotine involve in many organ systems and can induce physical and mental changing when quit smoking (Physical changing such as insomnia, cough, headache, nausea, fatigue, constipation, weight gain, etc. : Mental changing such as irritability, anxiety, difficulty in concentrating, depressed mood, anger, etc.). The severity and duration of these symptoms may occur differently in each smoker. Anxiety, irritability, anger, and difficulty in concentrating may occur within 2-3 hours after quit smoking, usually occur at initial 1-4 days and subside within 2-4 weeks. Craving, depression, and weight gain may still present until 6 months. From data above, nicotine withdrawal symptoms and physical and mental changing, which occur when quit smoking, may affect smoker's quality of life and their daily activities.

Quality of life in this study was reported by youth offenders who completed the 24 week of study. Thai Smoking Cessation Health Related Quality of Life (TSCHRQOL) test was used to assess the HRQOL of youth offenders during smoking cessation. This test contains 36 items and are divided into 4 parts, each part has 100 scores. It was tested at baseline (week 0) and 6 follow-up visits at weeks 2, 4, 8, 12, 16, and 24 after the quit date. The scores of HRQOL between the control and the study groups in each follow-up visit were compared by using independent *t*-test. One-way repeated measure ANOVA was used to compare scores within group at baseline and follow-up visits at weeks 2, 4, 8, 12, 16, and 24 after the quit date. Data of the scores of quality of life are shown in table 15-16

Table 15 The scores of Thai Smoking Cessation Health Related Quality of Life between the control and the study groups

Quality of life (score)	Week 0 Mean ± SD (range)			Week 2 Mean ± SD (range)			Week 4 Mean ± SD (range)			Week 8 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=51)	Study gr. (N=73)	*p* value[a]	Control gr. (N=45)	Study gr. (N=69)	*p* value[a]	Control gr. (N=25)	Study gr. (N=57)	*p* value[a]
General well-being (100)	73.63±13.78 (16.67,98.61)	73.29±14.75 (38.89,100.0)	0.871	69.93±12.01 (50.00,98.61)	76.86±14.75 (37.50,100.0)	0.005*	71.54±14.53 (25.00,98.61)	79.97±14.93 (31.94,100.0)	0.004*	71.83±10.58 (47.22,91.67)	79.73±16.54 (33.33,100.0)	0.012*
Satisfaction (100)	59.70±16.52 (21.88,100.0)	58.99±18.89 (9.38,100.0)	0.788	60.95±14.19 (25.00,90.63)	59.42±18.96 (18.75,100.0)	0.609	61.50±15.58 (31.25,90.63)	60.37±20.14 (15.63,100.0)	0.751	64.00±12.01 (40.63,84.38)	61.57±22.00 (15.63,100.0)	0.521
Self-control (100)	70.99±18.71 (18.75,100.0)	66.46±20.28 (25.00,100.0)	0.119	71.57±17.06 (25.00,100.0)	73.72±21.09 (25.00,100.0)	0.533	74.38±17.16 (25.00,100.0)	78.68±20.59 (12.50,100.0)	0.247	72.75±14.64 (37.50,100.0)	78.84±20.21 (6.25,100.0)	0.130
Mental and emotional problem (100)	76.63±15.09 (41.67,100.0)	78.00±16.87 (41.67,100.0)	0.564	77.98±14.62 (50.00,100.0)	82.65±16.68 (45.83,100.0)	0.110	80.83±15.03 (54.17,100.0)	85.99±14.87 (37.50,100.0)	0.074	84.17±13.12 (62.50,100.0)	87.35±14.65 (50.00,100.0)	0.353
Total (100)	70.24±11.00 (45.52,95.58)	69.19±11.36 (46.53,93.32)	0.526	70.11±10.02 (50.78,96.53)	73.16±13.35 (46.10,95.31)	0.148	72.06±11.38 (41.67,97.31)	76.26±14.18 (41.32,97.22)	0.084	73.19±8.52 (55.30,89.76)	76.87±14.17 (47.40,99.31)	0.150

[a] using independent t-test to compare mean of the control group with the study group

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

Table 15 The scores of Thai Smoking Cessation Health Related Quality of Life between the control and the study groups *(continued)*

Quality of life (score)	Week 0 Mean ± SD (range)			Week 12 Mean ± SD (range)			Week 16 Mean ± SD (range)			Week 24 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=14)	Study gr. (N=55)	*p* value[a]	Control gr. (N=5)	Study gr. (N=53)	*p* value[a]	Control gr. (N=5)	Study gr. (N=50)	*p* value[a]
General well-being (100)	73.63±13.78 (16.67,98.61)	73.29±14.75 (38.89,100.0)	0.871	79.27±9.62 (62.50,93.06)	82.90±14.00 (33.33,100.0)	0.363	86.39±4.33 (81.94,93.06)	84.46±15.09 (30.56,100.0)	0.506	88.89±7.41 (80.56,98.61)	86.45±13.10 (37.50,100.0)	0.686
Satisfaction (100)	59.70±16.52 (21.88,100.0)	58.99±18.89 (9.38,100.0)	0.788	68.31±7.54 (53.13,81.25)	66.08±20.14 (28.13,96.88)	0.514	70.63±13.55 (46.88,81.25)	64.21±22.56 (18.75,100.0)	0.536	72.50±10.22 (59.38,87.50)	67.50±21.38 (12.50,100.0)	0.610
Self-control (100)	70.99±18.71 (18.75,100.0)	66.46±20.28 (25.00,100.0)	0.119	80.80±13.08 (62.50,100.0)	85.91±16.55 (31.25,100.0)	0.288	100.00±0.00 (100.0,100.0)	86.91±17.65 (31.25,100.0)	<0.001*	97.50±5.59 (87.50,100.0)	89.25±15.26 (43.75,100.0)	0.238
Mental and emotional problem (100)	76.63±15.09 (41.67,100.0)	78.00±16.87 (41.67,100.0)	0.564	86.91±13.06 (62.50,100.0)	89.96±12.58 (45.83,100.0)	0.423	94.17±13.05 (70.83,100.0)	88.05±14.25 (54.17,100.0)	0.360	97.50±5.59 (87.50,100.0)	91.58±11.89 (62.50,100.0)	0.279
Total (100)	70.24±11.00 (45.52,95.58)	69.19±11.36 (46.53,93.32)	0.526	78.82±7.10 (66.41,89.76)	81.22±12.26 (46.35,98.87)	0.487	87.80±7.12 (75.26,92.19)	80.91±13.59 (52.52,100.0)	0.271	89.10±6.35 (78.74,95.49)	83.70±12.03 (42.19,100.0)	0.329

[a] using independent t-test to compare mean of the control group with the study group

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

Table 16 The scores of Thai Smoking Cessation Health Related Quality of Life within group

Follow-up visits	Control group (N = 5)		Study group (N = 50)	
	Total scores Mean ± SD	*p* value[a]	Total scores Mean ± SD	*p* value[a]
1st visit (week 0)	74.25 ± 8.47		70.45 ± 12.43	
2nd visit (week 2)	73.30 ± 7.86	0.670	75.43 ± 13.75	<0.001*
3rd visit (week 4)	76.01 ± 8.86	0.634	77.34 ± 14.95	<0.001*
4th visit (week 8)	80.14 ± 11.20	0.177	78.30 ± 14.05	<0.001*
5th visit (week 12)	82.14 ± 9.38	0.136	81.72 ± 12.05	<0.001*
6th visit (week 16)	87.80 ± 7.12	0.013*	81.73 ± 13.26	<0.001*
7th visit (week 24)	89.10 ± 6.35	0.015*	83.70 ± 12.03	<0.001*

[a] using one-way repeated measure analysis of variance to compare baseline (week 0) with each follow-up visit (weeks 2, 4, 8, 12, 16, and 24) in the control and the study groups

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

General well-being

The questionnaires of General well-being has 100 scores and consist of 18 questions associated with daily activities such as sleeping, working, eating, exercise, and social communicating. At baseline (week 0), general well-being scores in the study and the control groups were 73.29 ± 14.75 and 73.63 ± 13.78, respectively (p=0.871). At the first 3 follow-ups (weeks 2, 4, and 8), there were significantly different between 2 groups (p=0.005, 0.004, 0.012, respectively), i.e. the study group had better general well being than the control group. However, at weeks 12,16, and 24, the scores in both groups were increased from baseline but not significantly different between 2 groups (p=0.363, 0.506, 0.686, respectively). The reasons may be that the control group could abstain from smoking more than the study group as shown from the stages of change in Transtheoretical model in table 12. Hence initially they tended to have more nicotine withdrawal symptoms and affected their daily activities in the control group. The severity and duration of nicotine withdrawal symptoms will usally subside within a few weeks or months, therefore, the general

well-being in both groups was not significantly different in the last 3 follow-ups at weeks 12, 16, and 24.

Satisfaction

Satisfaction is self-satisfaction such as happiness, self-esteem, self-respect, self-confidence and associated with the relationship between smokers and their family or friends. Satisfaction questionnaires consist of 8 questions with 100 scores. From table 15, at baseline (week 0), satisfaction scores in the study and the control groups were not significantly different (p=0.788). In every visit, the scores of satisfaction in both groups were the lowest among the scores of all parts of HRQOL. However, the satisfaction scores in both groups were increased gradually in every visit (except in week 16 of the study group) and were not significantly different (p>0.05). From this study, the compulsory method and the voluntary method were not diferrent in term of self satisfaction.

Self-control

Self-control concerns with smokers' attitude to quitting. They may fear unsuccessful quit attempt and cravings if they stop smoking. Self-control questionnaires consist of 4 questions with 100 scores. At baseline (week 0), self-control scores in the study and the control groups were 66.46 ± 20.28 and 70.99 ± 18.71, respectively and not significantly different (p=0.119). Thereafter, the scores were increased in both groups but not significantly different between the study and the control groups except at week 16 (p<0.001). Therefore, self-control in compulsory method was similar to voluntary method.

Mental and emotional problems

Mental and emotional problems can occur when smokers try to quit. Smokers may have stress, irritability, depression, boredom, and anxiety during their quit attempt. These problems may affect their daily activities in joining with other persons such as their family or friends. In addition, weight gain or increased appetite may have effect on their mental and emotional problems. Mental and emotional problems may lead to poor quality of life. The questionnaires of this part contain 6 questions with 100 scores. At baseline (week 0), the mental and emotional scores in the study

and the control groups were 78.00 ± 16.87 and 76.63 ± 15.09, respectively and not significantly different (p=0.564). In every follow-up visit, the scores were increased from baseline in both groups but not significantly different between 2 groups (p>0.05). In conclusion, compulsory method and voluntary method had the same effect on mental and emotional problems.

Total quality of life

From table 15-16, the scores of Thai Smoking Cessation Health Related Quality of Life derived from the scores of 100 per part of general well-being, satisfaction, self-control, and mental and emotional problems. Total quality of life also has 100 scores calculated from sum scores of each part and divided by 4. The total quality of life's scores were not significantly different between the control and the study groups in every visit (p>0.05). When compared within group, total quality of life's scores in the study group were significantly increased from baseline (p<0.001) in every follow-up visit. Whereas in the control group, only total scores in 16 and 24 weeks after the quit date were significantly higher than that of baseline (p=0.013, 0.015, respectively). Zillich et al. suggested that quality of life in adults was improved within 3 months after abstinence [25]. Because youth offenders smoked less cigarettes, it was possible that total quality of life's scores improved earlier than adults. However, in the control group, there were only 5 youth offenders completed the 24 weeks of study, the sample size may be not enough to detect a difference within or between groups. Based on the results obtained, compulsory method had an effect on quality of life as same as voluntary method.

General knowledge of cigarette smoking

General knowledge of cigarette smoking test questionnaires consist of 20 items. The test was divided into 4 parts.

Part 1 contains 8 questions (item 1-8) which represented the dangers of smoking and chemical substances in cigarettes.

Part 2 contains 3 questions (item 9-11) which represented the advantages and methods of smoking cessation.

Part 3 contains 6 questions (item 12-17) which represented nicotine withdrawal symptoms and behavioral changing.

Part 4 contains 3 questions (item 18-20) which represented tobacco-control regulations and laws.

The questionnaire was tested for the content validity by 4 smoking cessaion experts. At the beginning, a pilot test of this questionnaire was carried out in 25 youth offenders for its reliability coefficient [i.e., Kuder-Richardson 20 formula (KR-20)]. Total reliability coefficient of a test was 0.881, higher than the desired criterion of 0.70. It indicated that this questionnaire had strong support and good consistency reliabilities. Data are shown in table 17

Table 17 Reliability coefficient of general knowledge of cigarette smoking test questionnaire by Kuder-Richardson 20 formula

General knowledge of cigarette smoking test	Reliability coefficient
Part 1	0.706
Part 2	0.627
Part 3	0.770
Part 4	0.732
Total	0.881

General knowledge of cigarette smoking test questionnaire was tested at baseline (week 0) and 3 follow-up visits at 4, 12, and 24 weeks after the quit date. Scores of general knowledge of cigarette test, between the control and the study

groups in each follow-up visit, were compared by using independent *t*-test. One-way repeated measure ANOVA was performed to compare scores within group at baseline and follow-up visits in 4, 12, and 24 weeks after the quit date. The scores of general knowledge of cigarette smoking test questionnaire are shown in table 18-19.

The mean scores of general knowledge of cigarette smoking between the study and the control groups at baseline were 11.63 ± 3.19 and 10.99 ± 2.97, respectively and not significantly different (p=0.160). In every follow-up visit, the scores were increased from baseline in both groups and there were not significantly different between 2 groups (p>0.05). When compared within group, the study group had total scores significantly increased from baseline (p<0.001) in every follow-up visit. In the control group, there were significantly increased from baseline only in 12 and 24 weeks after the quit date (p=0.028, 0.005, respectively). In conclusion, youth offenders in both groups improved their knowledge of cigarette smoking with time but not significantly different between both groups.

Youth offenders who attended more in this smoking cessation program had more knowledge of cigarette smoking. Smoking has many dangerous effects to health, both of the smoker themselves and the second smokers. Counseling smokers on the benefit of smoking cessation, methods of smoking cessation, nicotine withdrawal symptoms, and behavioral changing, make them realize the importance of quit smoking, skills to avoid an urge and changing their behavior during their quit attempt period. In addition, youth offenders who attended smoking cessation program may further advise other smokers in their family or in friends' group. Finally, the results of knowledge test could help the investigator evaluate the knowledge of cigarette smoking in youth offenders and appropriate counseling should be tailored to each youth offender.

Table 18 The scores of General knowledge of cigarette smoking between the control and the study groups

General knowledge of cigarette (score)	Week 0 Mean ± SD (range)			Week 4 Mean ± SD (range)			Week 12 Mean ± SD (range)			Week 24 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=45)	Study gr. (N=69)	*p* value[a]	Control gr. (N=14)	Study gr. (N=55)	*p* value[a]	Control gr. (N=5)	Study gr. (N=50)	*p* value[a]
Part 1 (8)	4.15±1.34 (1, 7)	4.31±1.39 (1, 7)	0.433	5.00±1.24 (2, 7)	5.14±1.35 (2, 8)	0.565	5.64±0.63 (4, 6)	6.07±1.30 (3, 8)	0.085	7.00±0.71 (6, 8)	6.9±9.3 (4, 8)	0.817
Part 2 (3)	1.23±0.90 (0, 3)	1.31±0.88 (0, 3)	0.532	1.56±0.84 (0, 3)	1.83±0.84 (0, 3)	0.096	2.00±0.78 (0, 3)	2.05±0.95 (0, 3)	0.844	2.80±0.45 (2, 3)	2.52±0.65 (1, 3)	0.350
Part 3 (6)	3.45±1.56 (0, 6)	3.72±1.34 (0, 6)	0.202	4.07±1.10 (2, 6)	4.43±1.22 (1, 6)	0.104	4.64±0.75 (3, 6)	4.73±1.21 (1, 6)	0.804	6.00±0.00 (6, 6)	5.42±0.84 (3, 6)	0.130
Part 4 (3)	2.16±0.89 (0, 3)	2.29±0.92 (0, 3)	0.349	2.69±0.67 (0, 3)	2.72±0.48 (1, 3)	0.741	2.86±0.36 (2, 3)	2.87±0.34 (2, 3)	0.879	3.00±0.00 (3, 3)	2.98±0.14 (2, 3)	0.755
Total (20)	10.99±2.97 (5, 17)	11.63±3.19 (3, 17)	0.160	13.31±2.32 (7, 18)	14.13±2.73 (8, 19)	0.100	15.14±1.29 (13, 17)	15.73±2.68 (8, 20)	0.248	18.80±1.19 (17, 20)	17.82±1.78 (13, 20)	0.235

[a] using independent t-test to compare mean of the control group with the study group

Table 19 The scores of General knowledge of cigarette smoking within group

Follow-up visits	Control group (N = 5)		Study group (N = 50)	
	Total scores Mean ± SD	*p* value[a]	Total scores Mean ± SD	*p* value[a]
1st visit (week 0)	11.80 ± 2.39		12.08 ± 5.90	
3rd visit (week 4)	13.20 ± 2.28	0.311	14.06 ± 2.77	<0.001*
5th visit (week 12)	15.80 ± 1.10	0.028*	15.66 ± 2.73	<0.001*
7th visit (week 24)	18.80 ± 1.19	0.005*	17.82 ± 1.78	<0.001*

[a] using one-way repeated measure analysis of variance to compare baseline (week 0) with each follow-up visits (weeks 4, 12, and 24) in both groups

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

Nicotine withdrawal and craving

Almost all people who try to quit smoking have some of nicotine withdrawal symptoms. Generally, the longer time has been a smoker and the more nicotine and higher number of cigarettes consumed, the more likely is the withdrawal symptoms and the severity. Regular smokers tend to have particularly strong cravings and worsening of withdrawal symptoms associated with smoking at certain times, places, or situations. Tobacco contains nicotine, an addictive chemical substance, which can induce smokers become addicted. If they quit abruptly, they will experience the physical and psychological effects of nicotine withdrawal symptoms. These may include intense cravings, anxiety, short temper, depression, sleeplessness, and increased appetite. The withdrawal symptoms will be worst in the first week and less severe during the second week. After a month, most of the withdrawal symptoms will be gone. If they quit gradually, the withdrawal symptoms may be less severe but more prolonged.

Minnesota Nicotine Withdrawal Scale (MNWS) is designed for assessing nicotine withdrawal symptoms, contains 9 items, each item has 4 scores. It was tested at baseline (week 0) and 6 follow-up visits at 2, 4, 8, 12, 16, and 24 weeks after the quit date. Scores of MNWS between the control and the study groups in each follow-up visit were compared by using independent *t*-test. One-way repeated measure ANOVA was performed to compare scores within group at baseline and all follow-up

visits after the quit date. Table 20-21 present scores of MNWS when compared between the control and the study groups and compared between week 0 and each week within groups. Total MNWS has 36 scores. The total scores between the study and the control groups at baseline were 9.96 ± 5.49 and 7.73 ± 4.59, respectively and not significantly different between 2 groups (p=0.003). Because some of youth offenders in the study group had stage of change in precontemplation stage (32.2%) while none of the control group were in precontemplation stage. Prokhorov et al. suggest that youths in precontemplation stage had mean nicotine dependence and nicotine withdrawal scores significantly higher than other stages [97]. It is consistent with the scores of general well being of quality of life in this study. General well-being scores was inversely related to nicotine withdrawal symptoms.

In the follow-up visits, total MNWS scores of the study group decreased continuously from baseline while general well-being scores increased continuously. In the control group, total MNWS scores increased from baseline within 2-12 week after quit date while general well-being scores decreased from baseline during 2-8 weeks. Total MNWS scores were not significantly different between 2 groups in all follow-up visits. When compared within group, youth offenders in the study group had total MNWS's scores decreased from baseline and had significant difference in 12, 16 and 24 weeks (p=0.004, <0.001, and <0.001, respectively). In the control group, there were not significantly different between baseline and other follow-up visits.

When considered each item of MNWS, scores of an urge to smoke between the study and the control groups at baseline were 1.98 ± 0.87 and 1.77 ± 0.77, respectively and not significantly different (p=0.093). But in the follow-up visits, scores of an urge to smoke of the study group were significantly lower than the control group in 2, 8, and 12 weeks (p=0.010, 0.003, and 0.029, respectively). The baseline score of the study group was higher, but for those of the follow-up visits (2-12 weeks) were lower than the control group. Because in the control group, youth offenders quit smoking abruptly and keep abstinence by never smoking after the quit date, then they would have high desire to smoke. In contrast, some of youth offenders in the study group quit smoking gradually by decreasing their number of cigarettes smoked per day, so they would have less desire to smoke and more prolonged than those in the control group.

Table 20 Minnesota Nicotine Withdrawal Scale (MNWS) between the control and the study groups

MNWS (score)	Week 0 Mean ± SD (range)			Week 2 Mean ± SD (range)			Week 4 Mean ± SD (range)			Week 8 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=51)	Study gr. (N=73)	*p* value[a]	Control gr. (N=45)	Study gr. (N=69)	*p* value[a]	Control gr. (N=25)	Study gr. (N=57)	*p* value[a]
Urge to smoke (4)	1.77±0.77 (0, 4)	1.98±0.87 (0, 4)	0.093	1.73±0.72 (0, 3)	1.34±0.85 (0, 3)	0.010*	1.47±0.82 (0, 3)	1.19±0.83 (0, 3)	0.080	1.64±0.81 (0, 3)	1.00±0.95 (0, 4)	0.003*
Depressed mood (4)	0.51±0.69 (0, 3)	0.72±0.79 (0, 3)	0.056	0.73±0.72 (0, 2)	0.51±0.67 (0, 2)	0.086	0.76±0.71 (0, 2)	0.55±0.76 (0, 3)	0.152	0.64±0.70 (0, 2)	0.54±0.73 (0, 3)	0.581
Irritability, frustration, or anger (4)	0.95±0.84 (0, 4)	1.10±1.12 (0, 4)	0.297	1.25±0.85 (0, 3)	0.85±0.92 (0, 3)	0.014*	1.22±0.99 (0, 4)	0.90±0.91 (0, 3)	0.083	1.44±1.16 (0, 4)	0.84±0.90 (0, 3)	0.013*
Anxiety (4)	0.87±0.73 (0, 3)	0.98±0.89 (0, 3)	0.369	1.04±0.75 (0, 3)	0.81±0.91 (0, 3)	0.124	1.02±0.92 (0, 4)	0.70±0.81 (0, 3)	0.055	1.24±1.05 (0, 4)	0.77±0.91 (0, 3)	0.060
Difficulty concentrating (4)	0.55±0.73 (0, 3)	0.83±0.95 (0, 4)	0.028*	0.88±0.71 (0, 2)	0.88±0.83 (0, 3)	0.969	0.91±0.87 (0, 3)	0.77±0.94 (0, 3)	0.417	0.88±0.97 (0, 3)	0.79±0.84 (0, 3)	0.670

[a] using independent t-test to compare mean of the control group with the study group

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

Table 20 Minnesota Nicotine Withdrawal Scale (MNWS) between the control and the study groups *(continued)*

MNWS (score)	Week 0 Mean ± SD (range)			Week 2 Mean ± SD (range)			Week 4 Mean ± SD (range)			Week 8 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=51)	Study gr. (N=73)	*p* value[a]	Control gr. (N=45)	Study gr. (N=69)	*p* value[a]	Control gr. (N=25)	Study gr. (N=57)	*p* value[a]
Restlessness (4)	0.57±0.78 (0, 4)	0.88±0.90 (0, 3)	0.013*	0.86±0.83 (0, 4)	1.04±0.98 (0, 4)	0.289	0.82±0.83 (0, 3)	0.90±0.91 (0, 3)	0.652	0.96±1.06 (0, 3)	0.75±1.02 (0, 4)	0.410
Increased appetite (4)	1.39±0.80 (0, 4)	1.81±1.16 (0, 4)	0.005*	1.71±0.92 (0, 4)	1.96±1.11 (0, 4)	0.184	2.18±1.07 (0, 4)	2.23±1.15 (0, 4)	0.802	1.96±0.98 (0, 4)	1.86±1.13 (0, 4)	0.700
Difficulty going to sleep (4)	0.67±0.77 (0, 3)	1.06±1.06 (0, 4)	0.006*	0.96±1.04 (0, 4)	0.89±1.09 (0, 4)	0.664	0.98±0.94 (0, 4)	1.00±1.07 (0, 4)	0.910	0.96±1.02 (0, 3)	0.93±1.03 (0, 3)	0.903
Difficulty staying asleep (4)	0.45±0.72 (0, 4)	0.60±0.90 (0, 4)	0.201	0.69±0.76 (0, 3)	0.81±1.01 (0, 4)	0.467	0.69±0.90 (0, 3)	0.74±0.95 (0, 3)	0.779	0.72±0.79 (0, 3)	0.65±0.90 (0, 3)	0.734
Total (36)	7.73±4.59 (2, 22)	9.96±5.49 (1, 24)	0.003*	9.84±4.52 (2, 22)	9.23±5.33 (1, 23)	0.506	10.04±5.09 (2, 23)	8.97±5.67 (0, 26)	0.307	10.44±6.04 (1, 27)	8.14±6.28 (0, 27)	0.126

[a] using independent t-test to compare mean of the control group with the study group

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

Table 20 Minnesota Nicotine Withdrawal Scale (MNWS) between the control and the study groups *(continued)*

MNWS (score)	Week 0 Mean ± SD (range)			Week 12 Mean ± SD (range)			Week 16 Mean ± SD (range)			Week 24 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=14)	Study gr. (N=55)	*p* value[a]	Control gr. (N=5)	Study gr. (N=53)	*p* value[a]	Control gr. (N=5)	Study gr. (N=50)	*p* value[a]
Urge to smoke (4)	1.77±0.77 (0, 4)	1.98±0.87 (0, 4)	0.093	1.43±1.09 (0, 3)	0.69±0.77 (0, 3)	0.029*	0.20±0.45 (0, 1)	0.66±0.81 (0, 3)	0.216	0.20±0.45 (0, 1)	0.52±0.68 (0, 2)	0.199
Depressed mood (4)	0.51±0.69 (0, 3)	0.72±0.79 (0, 3)	0.056	0.50±0.65 (0, 2)	0.56±0.83 (0, 3)	0.792	0.00±0.00 (0, 0)	0.42±0.75 (0, 3)	0.222	0.00±0.00 (0, 0)	0.38±0.60 (0, 2)	0.168
Irritability, frustration, or anger (4)	0.95±0.84 (0, 4)	1.10±1.12 (0, 4)	0.297	1.00±1.04 (0, 3)	0.82±0.98 (0, 3)	0.543	0.20±0.45 (0, 1)	0.62±0.90 (0, 3)	0.112	0.20±0.45 (0, 1)	0.42±0.67 (0, 3)	0.479
Anxiety (4)	0.87±0.73 (0, 3)	0.98±0.89 (0, 3)	0.369	1.00±0.78 (0, 3)	0.73±0.89 (0, 3)	0.271	0.40±0.55 (0, 1)	0.53±0.82 (0, 3)	0.735	0.20±0.45 (0, 1)	0.48±0.71 (0, 3)	0.391
Difficulty concentrating (4)	0.55±0.73 (0, 3)	0.83±0.95 (0, 4)	0.028*	0.64±0.75 (0, 2)	0.56±0.79 (0, 3)	0.735	0.00±0.00 (0, 0)	0.53±0.85 (0, 3)	0.171	0.00±0.00 (0, 0)	0.34±0.75 (0, 3)	0.316

[a] using independent t-test to compare mean of the control group with the study group

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

Table 20 Minnesota Nicotine Withdrawal Scale (MNWS) between the control and the study groups *(continued)*

MNWS (score)	Week 0 Mean ± SD (range)			Week 12 Mean ± SD (range)			Week 16 Mean ± SD (range)			Week 24 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=14)	Study gr. (N=55)	*p* value[a]	Control gr. (N=5)	Study gr. (N=53)	*p* value[a]	Control gr. (N=25)	Study gr. (N=50)	*p* value[a]
Restlessness (4)	0.57±0.78 (0, 4)	0.88±0.90 (0, 3)	0.013*	0.46±0.95 (0, 3)	0.55±0.79 (0, 3)	0.210	0.20±0.45 (0, 1)	0.53±0.67 (0, 2)	0.188	0.20±0.45 (0, 1)	0.46±0.76 (0, 3)	0.459
Increased appetite (4)	1.39±0.80 (0, 4)	1.81±1.16 (0, 4)	0.005*	2.14±1.03 (0, 4)	1.96±1.22 (0, 4)	0.614	2.00±0.71 (1, 3)	1.70±1.23 (0, 4)	0.430	1.40±0.89 (0, 2)	2.06±1.20 (0, 4)	0.239
Difficulty going to sleep (4)	0.67±0.77 (0, 3)	1.06±1.06 (0, 4)	0.006*	0.86±0.86 (0, 3)	0.67±0.64 (0, 3)	0.468	0.20±0.45 (0, 1)	0.55±0.93 (0, 4)	0.416	0.00±0.00 (0, 0)	0.54±0.84 (0, 3)	0.159
Difficulty staying asleep (4)	0.45±0.72 (0, 4)	0.60±0.90 (0, 4)	0.201	0.36±0.50 (0, 1)	0.51±0.69 (0, 3)	0.443	0.00±0.00 (0, 0)	0.55±0.77 (0, 3)	0.122	0.00±0.00 (0, 0)	0.40±0.73 (0, 3)	0.229
Total (36)	7.73±4.59 (2, 22)	9.96±5.49 (1, 24)	0.003*	8.79±5.52 (1, 20)	7.05±5.50 (0, 23)	0.297	3.20±1.92 (1, 6)	6.07±5.61 (0, 23)	0.263	2.20±2.28 (0, 6)	5.60±4.49 (0, 23)	0.102

[a] using independent t-test to compare mean of the control group with the study group

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

Table 21 Minnesota Nicotine Withdrawal Scale (MNWS) within group

Follow-up visits	Control group (N = 5)		Study group (N = 50)	
	Total scores Mean ± SD	*p* value[a]	Total scores Mean ± SD	*p* value[a]
1st visit (week 0)	6.60 ± 4.28		9.24 ± 5.06	
2nd visit (week 2)	9.00 ± 3.81	0.170	8.66 ± 5.34	0.393
3rd visit (week 4)	7.80 ± 3.70	0.547	8.62 ± 5.89	0.394
4th visit (week 8)	6.40 ± 4.88	0.942	7.90± 6.29	0.148
5th visit (week 12)	5.20 ± 3.77	0.640	6.66 ± 5.53	0.004*
6th visit (week 16)	3.20 ± 1.92	0.190	5.62 ± 5.24	<0.001*
7th visit (week 24)	2.20 ± 2.28	0.127	5.60 ± 4.49	<0.001*

[a] using one-way repeated measure analysis of variance to compare baseline (week 0) with each follow-up visits (weeks 2, 4, 8, 12, 16, and 24) in both groups

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

Negative effects such as depressed mood, irritability, or frustration, or anger, anxiety, and difficulty concentrating frequently occur in the first 2 weeks after the quit date [98]. There were not significantly different between the study and the control groups at baseline, except difficulty concentrating. Difficulty concentrating score in the study group was significantly higher than the control group (p=0.028). In the follow-up visits, only the scores of irritability or frustration or anger in the study group was significantly lower than those in the control group in 2 and 8 weeks (p=0.014 and 0.013, respectively). To sum up, most scores of negative effects in the study group were not significantly different from the control group.

Restlessness usually occurs in 4 weeks after the quit date [98]. It was found that at baseline the score of restlessness in the study group was significantly higher than that in the control group (p=0.013). In weeks 2-8, the scores in both groups increased from baseline but not significantly different (p>0.05). After 8 weeks, the scores began to decrease from baseline and not significantly different between 2 groups.

Increased appetite and weight gain may occur after quit smoking and may last for at least 6 months or longers [98]. Score at baseline in the study group was significantly higher than that in the control group (p=0.004). In every follow-up visit, most of the scores in both groups increased from baseline and not significantly different between 2 groups. The scores of increased appetite were higher than other items in both groups until the end of program. At initial, mean weights of youth offenders in the study and the control groups were 56.67 ± 10.18 and 54.45 ± 6.84 kilograms, respectively (p=0.086), data is shown in table 22. In every follow-up visit, mean weights of youth offenders in the study group were still higher than those in the control group but not significantly different between 2 groups. While comparing within group, youth offenders in both groups increased weights from baseline and had significant difference in every follow-up visit.

Sleeping patterns may be affected when stop smoking. In some cases may sleep more than before, whilst some may find difficult to get sleep, and wake up frequently during the night. These are temporary side effect and should not last longer than two weeks [98]. There were significantly different between the study and the control groups at baseline in difficulty going to sleep (p=0.006) but in every follow-up visit, there were not significantly different between 2 groups.

Table 22 Mean weight (kilogram) of youth offenders in the control and study groups

Follow-up visits N (control group, Study group)	Weight Mean ± SD (range)		*p* value[b]
	Control group	Study group	
1st visit (week 0) N=92,90	54.45 ± 6.84 (38.0, 73.0)	56.67 ± 10.18 (36.0, 90.0)	0.086
2nd visit (week 2) N=51,73	54.97 ± 7.46 (40.0, 74.0)	57.60 ± 10.88 (44.0, 99.0)	0.060
p value[a] (before-after)	<0.001*	0.023*	
3rd visit (week 4) N=45,69	55.11 ± 7.91 (41.0, 75.0)	57.99 ± 11.32 (44.1, 100.8)	0.141
p value[a] (before-after)	<0.001*	0.009*	
4th visit (week 8) N=25,57	54.84 ± 7.14 (40.5, 75.0)	57.14 ± 9.48 (46.0, 93.8)	0.124
p value[a] (before-after)	0.002*	0.013*	
5th visit (week 12) N=14,55	55.07 ± 8.54 (46.0, 74.0)	57.82 ± 9.94 (46.4, 96.6)	0.346
p value[a] (before-after)	0.005*	0.002*	
6th visit (week 16) N=5,53	57.00 ± 10.95 (46.0, 75.0)	57.96 ± 9.78 (47.0, 96.5)	0.836
p value[a] (before-after)	0.002*	0.001*	
7th visit (week 24) N=5,50	57.20 ± 10.90 (46.0, 75.0)	57.74 ± 9.38 (47.0, 98.5)	0.905
p value[a] (before-after)	0.003*	<0.001*	

[a] using paired t-test to compare mean at baseline (week 0) with each follow-up visits (weeks 2, 4, 8, 12, 16, and 24)

[b] using independent t-test to compare mean of the control group with the study group

* having a statistically significant difference at α = 0.05

Brief questionnaire of smoking urges (QSU-Brief) contains 10 items, each item has 7 scores. It is divided into 2 factors from craving reports. Factor 1 of the QSU-Brief represents a desire and intention to smoke with smoking perceived as pleasure or rewarding (item 1, 3, 6, 7, and 10), while factor 2 represents an anticipation of relief from negative effect with an urgent desire to smoke (item 4, 8, and 9).

QSU-Brief was tested at baseline (week 0) and 6 follow-up visits at 2, 4, 8, 12, 16, and 24 weeks after the quit date. Scores of QSU-Brief between the control and the study groups in each follow-up visit were compared by using independent *t*-test. One-way repeated measure ANOVA was performed to compare scores within group at baseline and follow-up visits in 2, 4, 8, 12, 16, and 24 weeks after the quit date. Table 23-24 show scores of QSU-Brief when compared between the control and the study groups and compared between week 0 and each week within groups.

Craving is the most prominent and bothersome symptoms, experienced during nicotine withdrawal and is anticipated by smokers as the most difficult aspect of quit smoking. In addition, craving may be a significant predictor of smoking relapse and. may impede a success of smoking cessation. However, an improved understanding of the development, course, and nature of craving may lead to advanced strategies for reducing craving or increasing smokers ability to cope with their craving. Furthermore, if craving is predictive of relapse, craving assessment may identify smokers at greatest risk for treatment failure and allow necessary changes in individual treatment planning [82].

Total QSU-Brief has 70 scores. The total scores between the study and the control groups at baseline were 22.98 ± 10.97 and 18.95 ± 7.37, respectively and were significantly different (p=0.004). Most scores of each item in the study group at baseline were higher than those in the control group. In the follow-up visits, total scores in the study group were slightly lower than those in the control group during 2-12 weeks but there were not significantly different (p>0.05).

Table 23 Brief questionnaire of smoking urges (QSU-Brief) between the control and the study groups

QSU-Brief (score)	Week 0 Mean ± SD (range)			Week 2 Mean ± SD (range)			Week 4 Mean ± SD (range)			Week 8 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=51)	Study gr. (N=73)	*p* value[a]	Control gr. (N=45)	Study gr. (N=69)	*p* value[a]	Control gr. (N=25)	Study gr. (N=57)	*p* value[a]
Item 1 (7)	2.60±1.02 (1, 5)	2.92±1.66 (1, 7)	0.116	2.45±1.24 (1, 7)	2.00±1.26 (1, 6)	0.050*	2.20±1.16 (1, 5)	1.74±1.07 (1, 5)	0.031*	2.12±0.97 (1, 4)	1.75±1.11 (1, 6)	0.157
Item 2 (7)	1.90±0.84 (1, 4)	2.18±1.18 (1, 5)	0.071	1.78±0.92 (1, 5)	1.68±0.91 (1, 4)	0.553	1.56±0.76 (1, 4)	1.59±1.05 (1, 5)	0.831	1.48±0.71 (1, 3)	1.49±0.91 (1, 6)	0.956
Item 3 (7)	1.87±1.15 (1, 7)	2.37±1.63 (1, 7)	0.019*	1.94±1.24 (1, 7)	1.74±0.99 (1, 5)	0.316	1.67±0.88 (1, 5)	1.58±1.05 (1, 6)	0.646	1.60±0.82 (1, 3)	1.65±1.01 (1, 6)	0.831
Item 4 (7)	2.12±1.08 (1, 7)	2.29±1.49 (1, 7)	0.383	1.82±1.01 (1, 5)	1.68±0.98 (1, 5)	0.448	1.64±0.91 (1, 4)	1.62±1.03 (1, 6)	0.910	1.68±0.85 (1, 3)	1.60±1.05 (1, 6)	0.727
Item 5 (7)	1.67±0.87 (1, 5)	2.10±1.24 (1, 6)	0.008*	1.69±0.99 (1, 5)	1.63±0.95 (1, 5)	0.751	1.60±0.86 (1, 4)	1.57±1.06 (1, 6)	0.855	1.48±0.82 (1, 4)	1.44±0.89 (1, 6)	0.843
Item 6 (7)	2.38±1.04 (1, 5)	2.42±1.28 (1, 6)	0.809	2.27±1.19 (1, 6)	1.97±1.21 (1, 6)	0.171	2.04±1.17 (1, 6)	1.87±1.35 (1, 7)	0.478	1.96±0.89 (1, 4)	1.68±1.02 (1, 5)	0.246

[a] using independent t-test to compare mean of the control group with the study group

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

Table 23 Brief questionnaire of smoking urges (QSU-Brief) between the control and the study groups *(continued)*

QSU-Brief (score)	Week 0 Mean ± SD (range)			Week 2 Mean ± SD (range)			Week 4 Mean ± SD (range)			Week 8 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=51)	Study gr. (N=73)	*p* value[a]	Control gr. (N=45)	Study gr. (N=69)	*p* value[a]	Control gr. (N=25)	Study gr. (N=57)	*p* value[a]
Item 7 (7)	1.93±0.86 (1, 4)	2.48±1.60 (1, 7)	0.005*	1.63±0.94 (1, 4)	1.78±1.06 (1, 5)	0.407	1.64±0.86 (1, 4)	1.72±1.14 (1, 6)	0.687	1.64±0.76 (1, 3)	1.67±1.06 (1, 5)	0.910
Item 8 (7)	1.47±0.75 (1, 5)	1.92±1.35 (1, 7)	0.006*	1.37±0.80 (1, 4)	1.53±0.91 (1, 4)	0.310	1.42±0.89 (1, 5)	1.57±0.98 (1, 6)	0.431	1.56±1.04 (1, 4)	1.46±0.78 (1, 4)	0.619
Item 9 (7)	1.42±0.83 (1, 6)	2.32±1.56 (1, 7)	<0.001*	1.49±0.83 (1, 5)	2.08±1.38 (1, 6)	0.004*	1.40±0.72 (1, 3)	1.62±1.00 (1, 6)	0.199	1.68±0.80 (1, 3)	1.61±1.13 (1, 6)	0.793
Item 10 (7)	1.58±0.89 (1, 5)	1.98±1.17 (1, 6)	0.010*	1.39±0.80 (1, 5)	1.53±0.91 (1, 6)	0.373	1.38±0.89 (1, 6)	1.41±0.75 (1, 4)	0.857	1.40±0.65 (1, 3)	1.39±0.77 (1, 5)	0.937
Total (70)	18.95±7.37 (10, 44)	22.98±10.97 (10, 55)	0.004*	17.84±7.36 (10, 38)	17.64±8.70 (10, 43)	0.894	16.56±6.99 (10, 34)	16.29±9.34 (10, 52)	0.871	16.60±6.56 (10, 32)	15.74±8.34 (10, 52)	0.648

[a] using independent t-test to compare mean of the control group with the study group

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

Table 23 Brief questionnaire of smoking urges (QSU-Brief) between the control and the study groups *(continued)*

QSU-Brief (score)	Week 0 Mean ± SD (range)			Week 12 Mean ± SD (range)			Week 16 Mean ± SD (range)			Week 24 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=14)	Study gr. (N=55)	*p* value[a]	Control gr. (N=5)	Study gr. (N=53)	*p* value[a]	Control gr. (N=5)	Study gr. (N=50)	*p* value[a]
Item 1 (7)	2.60±1.02 (1, 5)	2.92±1.66 (1, 7)	0.116	1.93±0.99 (1, 4)	1.36±0.70 (1, 4)	0.063	1.20±0.45 (1, 2)	1.40±0.82 (1, 4)	0.600	1.20±0.45 (1, 2)	1.28±0.61 (1, 4)	0.776
Item 2 (7)	1.90±0.84 (1, 4)	2.18±1.18 (1, 5)	0.071	1.50±0.65 (1, 3)	1.29±0.66 (1, 4)	0.291	1.00±0.00 (1, 1)	1.28±0.57 (1, 3)	0.273	1.00±0.00 (1, 1)	1.14±0.41 (1, 3)	0.446
Item 3 (7)	1.87±1.15 (1, 7)	2.37±1.63 (1, 7)	0.019*	1.36±0.63 (1, 3)	1.29±0.60 (1, 4)	0.716	1.00±0.00 (1, 1)	1.25±0.59 (1, 3)	0.357	1.00±0.00 (1, 1)	1.14±0.41 (1, 3)	0.446
Item 4 (7)	2.12±1.08 (1, 7)	2.29±1.49 (1, 7)	0.383	1.64±0.84 (1, 3)	1.31±0.61 (1, 3)	0.182	1.20±0.45 (1, 2)	1.45±0.91 (1, 5)	0.544	1.00±0.00 (1, 1)	1.24±0.63 (1, 4)	0.398
Item 5 (7)	1.67±0.87 (1, 5)	2.10±1.24 (1, 6)	0.008*	1.36±0.63 (1, 3)	1.20±0.49 (1, 3)	0.315	1.20±0.45 (1, 2)	1.28±0.63 (1, 3)	0.776	1.00±0.00 (1, 1)	1.14±0.45 (1, 3)	0.495
Item 6 (7)	2.38±1.04 (1, 5)	2.42±1.28 (1, 6)	0.809	1.93±0.92 (1, 3)	1.55±1.00 (1, 5)	0.197	1.20±0.45 (1, 2)	1.49±0.91 (1, 4)	0.487	1.00±0.00 (1, 1)	1.34±0.75 (1, 5)	0.316

[a] using independent t-test to compare mean of the control group with the study group

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

Table 23 Brief questionnaire of smoking urges (QSU-Brief) between the control and the study groups *(continued)*

QSU-Brief (score)	Week 0 Mean ± SD (range)			Week 12 Mean ± SD (range)			Week 16 Mean ± SD (range)			Week 24 Mean ± SD (range)		
	Control gr. (N=92)	Study gr. (N=90)	*p* value[a]	Control gr. (N=14)	Study gr. (N=55)	*p* value[a]	Control gr. (N=5)	Study gr. (N=53)	*p* value[a]	Control gr. (N=5)	Study gr. (N=50)	*p* value[a]
Item 7 (7)	1.93±0.86 (1, 4)	2.48±1.60 (1, 7)	0.005*	1.64±0.84 (1, 3)	1.33±0.60 (1, 3)	0.203	1.20±0.45 (1, 2)	1.30±0.58 (1, 3)	0.702	1.00±0.00 (1, 1)	1.16±0.37 (1, 2)	0.342
Item 8 (7)	1.47±0.75 (1, 5)	1.92±1.35 (1, 7)	0.006*	1.36±0.93 (1, 4)	1.24±0.51 (1, 3)	0.512	1.20±0.45 (1, 2)	1.32±0.70 (1, 4)	0.708	1.00±0.00 (1, 1)	1.12±0.33 (1, 2)	0.421
Item 9 (7)	1.42±0.83 (1, 6)	2.32±1.56 (1, 7)	<0.001*	1.71±0.83 (1, 3)	1.51±0.98 (1, 5)	0.474	1.20±0.45 (1, 2)	1.45±0.87 (1, 4)	0.525	1.00±0.00 (1, 1)	1.16±0.42 (1, 3)	0.404
Item 10 (7)	1.58±0.89 (1, 5)	1.98±1.17 (1, 6)	0.010*	1.21±0.58 (1, 3)	1.16±0.42 (1, 3)	0.711	1.00±0.00 (1, 1)	1.17±0.43 (1, 3)	0.381	1.00±0.00 (1, 1)	1.06±0.24 (1, 2)	0.582
Total (70)	18.95±7.37 (10, 44)	22.98±10.97 (10, 55)	0.004*	15.64±6.17 (10, 27)	13.24±4.92 (10, 30)	0.126	11.40±3.13 (10, 17)	13.40±6.30 (10, 33)	0.489	10.20±0.44 (10, 11)	11.78±3.67 (10, 25)	0.344

[a] using independent t-test to compare mean of the control group with the study group

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

Table 24 Brief questionnaire of smoking urges (QSU-Brief) within group

Follow-up visits	Control group (N = 5)		Study group (N = 50)	
	Total scores Mean ± SD	*p* value[a]	Total scores Mean ± SD	*p* value[a]
1st visit (week 0)	16.00 ± 5.05		22.76 ± 11.48	
2nd visit (week 2)	12.00 ± 2.35	0.037*	15.90 ± 7.48	<0.001*
3rd visit (week 4)	11.60 ± 2.61	0.049*	16.36 ± 10.15	<0.001*
4th visit (week 8)	10.80 ± 1.79	0.055	15.10 ± 8.16	<0.001*
5th visit (week 12)	10.80 ± 1.79	0.055	13.14 ± 4.84	<0.001*
6th visit (week 16)	11.40 ± 3.13	0.071	13.00 ± 5.99	<0.001*
7th visit (week 24)	10.20 ± 0.44	0.055	11.78 ± 3.67	<0.001*

[a] using one-way repeated measure analysis of variance to compare baseline (week 0) with each follow-up visits (weeks 2, 4, 8, 12, 16, and 24) in both groups

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

When compared within group, the study group had total QSU-Brief's scores decreased from baseline and had significant difference ($p<0.001$) in every follow-up visit. Whereas in the control group, the total scores also decreased from baseline but were only significantly different in 2 and 4 weeks after the quit date ($p=0.037$ and 0.049, respectively). Cox et al. suggested that craving usually most occur within 1 week after the quit date [82]. The first follow-up visit in this study was set at 2 weeks after quit date, therefore, the total scores were not shown to increase from the baseline. In addition, youth offenders smoked fewer cigarettes and had lower nicotine dependence than adults, therefore, cravings would be less too.

When considered factor 1 (item 1, 3, 6, 7, and 10), it was found that scores of item 3, 7, and 10 of the study group at baseline were significantly higher than those in the control group ($p=0.019$, 0.005, and 0.010, respectively). In the follow-up visits, only item 1 (I have a desire for a cigarette right now) had significant difference between 2 groups at weeks 2 and 4 ($p=0.050$ and 0.031, respectively). While mean score of item 1 at baseline in the control group was 2.60 ± 1.02 and the study group was 2.92 ± 1.66, those at weeks 2 and 4 in the control group was higher than the study group (week 2: 2.45 ± 1.24 and 2.00 ± 1.26, respectively; week 4: 2.20 ± 1.16 and

1.74 ± 1.07, respectively). Because youth offenders in the study group had desire for cigarette less than those in the control group. It was consistent with the number of cigarettes smoked per week (table 13) which showed that youth offenders in the study group smoked cigarettes less than those in the control group. It was an adventage of compulsory method that make youths fear of punishment if they still smoke. They may have attempt to quit smoking or decrease their cigarettes better than voluntary method.

From factor 2 (item 4, 8, and 9), there were significantly different between both groups at baseline in item 8 and 9 (p=0.006 and <0.001, respectively). In the follow-up visits, mean score of item 9 (Smoking would make me less depressed) in week 2 was 1.49 ± 0.83 in the control group and 2.08 ± 1.38 in the study group and there were significantly different between 2 groups (p=0.004). Depressed mood in youth offenders occurred easily because they concerned with their penalty or had problem with their family or friends. Counselor should look for other activities to relieve their depression instead of smoking cigarettes.

In conclusion, most craving in both groups were not different in follow-up periods although there were different at baseline. At the end of program, some youth offenders in compulsory method still had craving because they did not have total abstinence from smoking. Frequent follow-up visits should be set for future smoking cessation program until these youths can quit smoking. Because when they explain their craving, the counselor can help them solve this problem immediately.

3. Factors associated with number of cigarettes smoked per day.

Univariate regression, the level of significance was set at an $\alpha = 0.25$, was performed to determine association between number of cigarettes smoked per day and 13 independent variables as followed :

1. Self factors (8 variables) such as gender, age, educational level, daily income or allowance, alcohol consumption, age started smoking, number of year smoked, and a period of watching television per day
2. Parental factors (3 variables) such as educational level, monthly income, and marital status
3. Environmental factors (2 variables) such as number of smokers living at home and number of smokers in friends' group

Table 25 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 year smoked, a period of watching television per day, marital status of parents, number of smokers living at home, and number of smokers in friends' group had positive correlation with 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 number of cigarettes smoked per day.

Factors which had statistically significant ($p<0.25$) correlation with number of cigarettes smoked per day were 9 variables as followed: educational level of youth offenders, daily income or allowance, alcohol consumption, age started smoking, number of year smoked, a period of watching television per day, monthly income, number of smokers living at home, and number of smokers in friends' group.

Table 25 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 $\alpha = 0.25$

Educational level of youth offenders had negative correlation with number of cigarettes smoked per day. This finding is consistent with Wagenknecht et al. study which suggested that the relationship between education and cigarette smoking patterns were strong inversion. The smoking behavior decreased with increasing education, from 54% among participants with less than a high school education to 12% among those with graduate degrees (p<0.001) [99]. Supawongse et al., explored the behavior of Thai youths in 16 provinces (N=3404), demonstrated that youths who smoked regulary were more likely to have poor educational performance or low education [41].

Daily income or allowance had positive correlation with number of cigarettes smoked per day. If youths had more money, they would buy more cigarettes. Supawongse et al., showed that youth who had more income was the higher rate of smoking [41]. It is similar to the study of Townsend et al. which found that cigarettes consumption by young men was increased with their income [100].

Alcohol consumption had positive correlation with number of cigarettes smoked per day. Youths who drink alcohol, usually smoke cigarettes. Ma et al. suggested that the usage of cigarettes and alcohol was closely related [101]. It is consistent with study of Batel et al. which found that the amount of tobacco smoked was correlated with the amount of alcohol consumed and there was a correlation between the severity of alcohol and nicotine dependence [102]. Counseling in a smoking cessation program, counselor would have encountered and spent more time to educate them to quit and/or reduce alcohol consumption.

Age started smoking had negative correlation with number of cigarettes smoked per day. The early onset of smoking may affect the likelihood of becoming addicted to nicotine and smoking heavily. It corresponds with study of Everett et al. which found that a younger age of smoking initiation was associated with smoking more cigarettes per day than was initiating at an older age [103]. In addition, age started smoking was correlated with smoking cessation rate. Breslau et al. suggested that the likelihood of smoking cessation rate was greater in smokers who had begun cigarette smoking after age 13 years than in those who had begun earlier [104]. Comparing with smokers in the earliest initiation group (age less than 13 years), smokers who bagan at 14-16 years were 1.6 times more likely to quit, and those who bagan at age 17 years or later were twice as likely to quit [104].

Number of year smoked had positive correlation with number of cigarettes smoked per day. Like age started smoking, a more number of year smoked may affect the likelihood of becoming addicted to nicotine and smoking heavily.

A period of watching television per day had positive correlation with number of cigarettes smoked per day. It is consistent with study of Gutschoven et al. which found that television viewing is significantly related to smoking volume, youths who watched 5 or more hours per day smoked between 60 and 147 cigarettes per week than those who watched 1 hour or less [105]. In addition**,** Gidwani et al. suggested that youth who watched television more than 4 to 5 hours per day were 5.24 times more likely to initiate smoking than youths who watched less than 2 hours (95% confidence interval: 1.19–23.10) [106].

Monthly income of their parents had negative correlation with number of cigarettes smoked per day. Soteriades et al. found that parents with low incomes were more likely to have youths smoke cigarettes [91]. Blow et al. suggested that household income and youth's smoking status were an inverse relationship [107].

Number of smokers living at home had positive correlation with number of cigarettes smoked per day**.** Tyas et al. found that youth smoking was associated with parental smoking and sibling smoking at home [108].

Number of smokers in friends' group had positive correlation with number of cigarettes smoked per day. In this study, correlation coefficient (R) and correlation of determination (R^2) between number of cigarettes smoked per day and this factor were higher than others. Homsin found that peer smoking was a strong influence to smoking status of youth [109]. Similarly, study of Tyas et al.which found that youth smoking was associated with peer smoking [108]. In addition, Bauman et al. suggested that friend smoking behavior was a strong correlate with youth smoking behavior [110].

Then, we selected the 9 associated independent variables to further analysis with stepwise multiple regression. The backward stepwise regression was used as a method of building the model. Table 26-27 present variables associated with the number of cigarettes smoked per day and model summary when calculated with multiple regression analysis. It was found that 3 independent variables, which had moderate association with number of cigarettes smoked per day (R=0.49) and had a statistically significant difference at $\alpha = 0.05$, were: (1) the number of smokers in

friends' group, (2) age started smoking, and (3) educational level of youth offenders at senior high school. These 3 variables could explain the variance of the number of cigarettes smoked per day by 24% (R^2=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 was senior high school)

Table 26 Backward stepwise regression analysis between factors and number of cigarettes smoked per day

Factors	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 α = 0.05

Table 27 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 α = 0.05

From data above, it was concluded that variables associated with the number of cigarettes smoked per day were the number of smokers in friends'group, age started smoking, and youth's educational level. For the future smoking cessation program, one should consider if youth had more friends smoking, started smoking at young age, and educational level less than senior high school. In addition, prevention

youths from smoking should be started in family and primary school level such as teaching them about dangers of smoking and making role models for them. Many friends smoking was a main factor which associated with more number of cigarettes smoked per day, so controlling about this factor should define “No smoking” campaign in all schools and considering harsher penalty for cigarette sellers who sell to youths aged under 18 such as revoking permit to sell cigarette. Recently, Ministry of Public Health issued ministerial regulation to penalize youths aged under 18 who bought cigarettes [8]. However, future study should recruit more youths to find other factors which associated with number of cigarettes smoked per day.

4. Costs of a pharmacist-based smoking cessation program for youth offenders.

Costs of a pharmacist-based smoking cessation program for youth offenders was calculated by :

Costs of program = Pharmacist's wages + Documentary expenses

Pharmacist's wages = Pharmacist's working time x mean salary per minute

Table 28 shows pharmacist's working time for counseling youth offenders in a pharmacist-based smoking cessation program of this study. A mean pharmacist's working time in weeks 0, 2, 4, 8, 12, 16, and 24 were 48.22 ± 4.59, 35.37 ± 4.02, 27.15 ± 3.57, 25.31 ± 4.04, 23.16 ± 3.23, 21.45 ± 4.11, and 20.22 ± 3.84 minutes, respectively. It was found that pharmacist's working time for the first visit was longer than the other visits and continuously decreased in the following visits. Spending more time in the first visit was very important because making a relationship between pharmacist and youth offenders may help them feel relax and confident to ask questions they did not know or understand. Other reasons for spending more time in the first visit were: demographic data and smoking history had to be recorded, interviewed for more information of their problems and their knowledge of cigarette smoking, and prepared all data and information needed for their next visits. The follow-up visits spent less times because they had more confidence to talk about their problems, pharmacist did not take much time to probe into their problems, so less time was needed for counseling and solving problems on smoking and behavioral changing.

Table 28 Pharmacist's working time for counseling youth offenders in a pharmacist-based smoking cessation program

Data	Working time for counseling (minutes)						
	week 0	week 2	week 4	week 8	week 12	week 16	week 24
Minimum time	45	25	20	20	15	15	15
Maximum time	60	40	30	30	30	30	30
Mean	48.22	35.37	27.15	25.31	23.16	21.45	20.22
Standard deviation	4.59	4.02	3.57	4.04	3.23	4.11	3.84

Table 29 shows a mean cost of a pharmacist-based smoking cessation program/person/visit. Pharmacist's wages was calculated from pharmacist's working time multiply with mean salary per minute. Therefore, cost of the program partly depends on the pharmacist's wages. In this study, there was only one pharmacist working in this smoking cessation program i.e. the investigator, whose mean salary was 11,650 baht, so mean pharmacist's salary per minute in this study was 1.10 baht. The mean cost of a pharmacist-based smoking cessation program/person/visit was between 24.74 – 105.04 baht. If there were more youth offenders participated in the program, the documentary expenses may be reduced due to more copies order should have lower price. Costs of program in this study was not high when compared to costs of treatment for compliclations of smoking both of acute and chronic diseases in the future if they continued smoking.

In this smoking cessation program, the pharmacist (the investigator of this study) provided counseling on advantages of smoking cessation, dangers of continuous smoking, behavioral changing, sodium nitrate mouthwash use, skills for avoidance an urge, and willpower motivation, and arranged the follow-up visits in 6 months. Smoking cessation program should continuously encourage youths to have long abstinence and help them not return to smoking. Frequent follow-ups could help pharmacist to solve problems readily if occurred such as return to smoking because of craving, stress, alcohol drinking, etc.. In addition, pharmacist as a counselor in a smoking cessation program was a new responsibility differed from previously that pharmacist was a person who counsel about medicine only.

Table 29 Costs of a pharmacist-based smoking cessation program/person/visit

Expenses	Amount of money (baht)						
	week 0	week 2	week 4	week 8	week 12	week 16	week 24
General history and smoking history forms (FTND, Transtheoretical Model, “Why are you still smoking?”	2.50	-	-	-	-	-	-
Questionnaires (TSCHRQOL, General knowledge of cigarette smoking, Withdrawal and craving scale)	2.50	2.00	2.50	2.00	2.50	2.00	2.50
Follow-up visit record form	1.00	-	-	-	-	-	-
Self-report	1.00	-	-	-	-	-	-
Sodium nitrate mouthwash	45.00	-	-	-	-	-	-
Pharmacist’s wages	53.04	38.91	29.87	27.84	25.48	23.60	22.24
Mean costs of program	105.04	40.91	32.37	29.84	27.98	25.60	24.74

CHAPTER V

CONCLUSIONS

This quasi-experimental, nonequivalent pretest-posttest control group trial was designed to evaluate the effectiveness of a pharmacist-based smoking cessation program for youth offenders who were judged to impose restrictions on conduct between compulsory and voluntary methods in terms of: (1) abstinence rate, (2) health related quality of life, and (3) general knowledge of cigarette smoking. In addition, this study was designed to determine factors associated with the number of cigarettes smoked per day in youth offenders and to analyse the costs of a pharmacist-delivered smoking cessation program for youth offenders. The study was conducted from January 1, 2008 to March 15, 2009 at Juvenile and Family Section, Pathumtani Provincial Court and Thanyarak Institute. The subjects were youth offenders who committed a crime and were judged to behavior restraining, smoked cigarettes regulary in the past 6 months. Besides cigarettes, they did not use other forms of tobacco products e.g., snuff, chewing tobacco, cigars, pipes and had no history of alcohol or drug abuse e.g., amphetamine, ecstasy, heroin, marijuana in the past year. One hundred and eighty two eligible youth offenders were conveniently assigned into the control and the study groups by judge's discretion. All youth offenders in both groups attended a pharmacist-based smoking cessation program at the outpatient department of Thanyarak Institute for 7 times (at weeks 0, 2, 4, 8, 12, 16, and 24) after the target quit date. The primary outcomes were self-report of continuous abstinence rate (CAR) and the 7-day point prevalence abstinence rate (PAR) which were confirmed by the measurement of urine cotinine. Subjects who discontinued the study or lost to follow-up were classified as smokers for the remainder of the study. All observed or self-report adverse events during the treatment period were documented in case report forms at week 1 and followed up until they resolved or to the end of study. Data were analyzed by using intention to treat analysis with a significant level of 0.05. Descriptive and inferential statistics were used to evaluate data. The conclusions of this study are as followed:

1. Baseline characteristics of youth offenders in compulsory and voluntary methods were not significantly different in terms of gender, age, offending case,

sentences status, educational level, living status, number of siblings, birth order, working status, daily income or allowance, underlying disease, and alcohol consumption. Of total 182 youth offenders who had participated in the study. The majority were male (96.7%) with the mean ± SD age of 16.72 ± 1.17 years. They were more likely to have poor educational performance, low educational levels and early school dropouts. About 75% lived with their parents or either father or mother. A half of them worked as employees or labourers. The mean ± SD daily income or allowance was 130.03 ± 71.46 baht. Eighty seven percent did not have any underlying diseases and 63.2% had a history of alcohol consumption.

2. All baseline characteristics of youth offender's parent in compulsory method were not significantly different from those in voluntary method in terms of: educational level, marital status, father's occupation, mother's occupation, and monthly income. The majority of the parents were more likely to have moderate to low socioeconomic status. Forty eight percent of parents were married or living together and 31.8% were separated or divorced. Most parents were employee (father: 51.1%, mother: 47.8%) and had monthly income under 10,000 baht (62.6%).

3. Smoking history of both youth offenders in compulsory and voluntary methods were not significantly different. They smoked an average of 7.69 ± 4.62 cigarettes/day, started their first cigarette at 14.31 ± 1.67 years of age and smoked daily for 2.53 ± 1.59 years. Most youth offenders bought splitting cigarette packet (74.1%) and spent money for the cigarettes approximately 20.12 ± 11.59 baht per day. Fifty eight percent had smokers living in their houses [i.e., father (33.0%), mother (3.3%), brothers (20.9%), or other relatives (19.2%)]. Most of youth offenders (97.8%) had friends who smoked and the mean number of smokers in their friends' group was 7.10 ± 4.32. They had a mean Fagerström Test for Nicotine Dependence (FTND) scores of 2.63 ± 1.75, indicating low nicotine dependence. This result was consistent with the assessment of "why are you still smoking?" questionnaire, and the total scores showed that psychological and socio-cultural effects were the strongest effects of their smoking dependence rather than nicotine effects. However, stages of change in Transtheoretical Model in youth offenders in compulsory method were significantly different from those in voluntary method (p<0.001). Youth offenders in compulsory method had stages of change in precontemplation (32.2%), contemplation (30.0%), and preparation (31.1%) while those in voluntary method were in the stages

of contemplation (27.2%), preparation (57.6%), and action (15.2%). Because one-third of youth offenders in the compulsory method were not willing to quit smoking, it was more difficult to motivate them to try to quit than those in the voluntary method. Thus continuous abstinence rate in voluntary method was higher than those in compulsory method.

4. All previous quit attempts data of youth offenders in compulsory method were not significantly different from those in voluntary method. Most (80.8%) youth offenders had history of previous quit attempts. A mean number ± SD of quit attempts was 1.67 ± 1.59. A mean longest quitting period was 24.38 ± 56.37 days (median = 7 days). The most (59.9%) quitting method used was cold turkey (willpower) method or suddenly quit smoking. The most reason for quit smoking was the desire to quit (57.2%) and the most reason for relapse was cigarette craving (67.1%).

5. The most intrinsic factor which induced youth start smoking was self-experiment (81.9%) and the most extrinsic factor was persuasion by their friends (54.9%). There were not significantly different between compulsory and voluntary methods, except factor “for smart” which was chosen by youth offenders in compulsory method more than those in voluntary method (p=0.029).

6. Attitudes of youth offenders to tobacco-control laws were not significantly different between compulsory and voluntary methods. Most of them (58.8%) agreed with the law that warning labels, picture or text, must be shown on all cigarette’s cases but they (61.5%) disagreed with the law to prohibit sellers from showing cigarettes in their shops.

7. Continuous abstinence rates in every follow-up visit in the voluntary method were higher than the compulsory method but there were not significantly different between 2 methods (p>0.05). Youth offenders in compulsory method could not quit smoking instantly but they gradually decreased their cigarettes and stopped after the quit date. Seven-day point prevalence abstinence rates in 2, 4, 8, and 12 weeks were not significantly different between compulsory and voluntary methods. However, 7-day point prevalence abstinence rates in 16 and 24 weeks in compulsory method were significantly higher than voluntary method (p=0.026 and 0.002, respectively). At the end of program (week 24), point prevalence abstinence rate in compulsory method was 35.6% whileas in voluntary method was 15.2%. It seemed

that 7-day point prevalence abstinence rate in compulsory method was higher than voluntary method. We could predict that intervention in a pharmacist-based smoking cessation program had positive effect on smoking cessation in youth offenders. However, there were confounding variables affected the results of this study such as this study was not randomized and stages of change in Transtheoretical Model at baseline characteristics were different between 2 methods.

8. A number of cigarettes smoked per week was significantly decreased from baseline to 24 weeks in both groups. At baseline, mean number of cigarettes smoked per week were 55.92 ± 30.24 and 51.97 ± 34.12 in the compulsory and the voluntary methods, respectively. In 24 weeks, a mean number of cigarettes smoked per week were 9.97 ± 13.27 and 27.70 ± 26.34 in the compulsory and the voluntary methods, respectively. When compared between both groups, it was found that a mean number of cigarettes smoked per week in the compulsory method was significantly lower than the voluntary method in every follow-up visit. It seemed that compulsory method had more effect on helping youth offenders to decrease number of cigarettes smoked per week than voluntary method.

9. Total quality of life's scores were not significantly different between compulsory and voluntary methods in every visit. But general well-being scores of follow-up visits at weeks 2, 4, and 8 were significantly different between 2 groups (p=0.005, 0.004, 0.012, respectively). While comparing within group, youth offenders in the compulsory method had total quality of life's scores significantly increased from baseline (p<0.001) in every follow-up visit. In voluntary method, there were significantly increased in 16 and 24 weeks after the quit date (p=0.013 and 0.015, respectively). This data suggested that youth offenders who attended a pharmacist-based smoking cessation program had quality of life higher than before.

10. Total general knowledge of cigarette smoking's scores were not significantly different between compulsory and voluntary methods in every visit. In every follow-up visit, youth offenders in the compulsory method had total scores significantly increased from baseline (p<0.001). In voluntary method, there were significantly increased in 12 and 24 weeks after quit date (p=0.028 and 0.005, respectively). It showed that youth offenders who attended more in this smoking cessation program had more knowledge of cigarette smoking.

11. The most nicotine withdrawal symptoms frequently occurred in this study were urge to smoke and increased appetite. An urge to smoke was not significantly different between 2 methods at baseline. But in follow-up visits, the scores in 2, 8, and 12 weeks of youth offenders in voluntary method were significantly higher than those in compulsory method (p=0.010, 0.003, and 0.029, respectively). Because youth offenders in voluntary method quit smoking abruptly, then they would have high desire to smoke. In contrast, some of youth offenders in compulsory method quit smoking by gradually decreased their cigarettes, so they would have less desire to smoke but more prolonged than those in the voluntary method. Increased appetite and weight gain score at baseline in compulsory method was significantly higher than that in voluntary method (p=0.004). In every follow-up visit, most of the scores were increased from baseline but not significantly different between 2 methods. It was consistent with data of mean weights of youth offenders which significantly increased from baseline in both methods.

12. Almost all of the craving scores from QSU-brief scale in both methods were not different in follow-up periods although there were different at baseline. Youth offenders in the compulsory method had total QSU-Brief's scores significantly decreased from baseline (p<0.001) in every follow-up visit. In voluntary method, there were significantly decreased only in 2 and 4 weeks after the quit date from baseline (p=0.037 and 0.049, respectively).

13. Number of smokers in friends' group, age started smoking, and educational level at senior high school had moderate association with number of cigarettes smoked per day (R=0.49). These 3 variables could predict number of cigarettes smoked per day accurately 24% (R^2=0.24). The equation found by this study was:

Number of cigarettes = 12.716 + 0.413 (Number of smokers in friends'group)
Smoked per day -0.531 (Age started smoking) -1.75 (if educational level was senior high school)

For the future smoking cessation program, counseller should consider if youth had more friends smoking, started smoking at young age, and educational level less than senior high school. In addition, prevention youths from smoking should be started in family and at primary school level such as teaching them about dangers of smoking and making role models for them. Furthermore defining "No smoking"

campaign in all schools and considering harsher penalty for cigarette sellers, who sell to youths aged under 18, such as revoking permit to sell cigarette.

14. The mean costs of a pharmacist-based smoking cessation program/person/ visit were 24.74 – 105.04 baht. Costs of program in this study were not high when compare to costs of treatment for compliclations of acute and chronic diseases from smoking which would occur in the future if they continue smoking.

Limitations

1. Sample size was too small and power was not adequate to detect statistically difference between compulsory and voluntary methods although abstinence rates in compulsory method were higher than voluntary method.

2. We did not have any follow-up visits after 24 weeks, then we did not know if youth offenders returned to smoke after they completed a pharmacist-based smoking cessation program.

3. Most of youth offenders had smokers living in their houses and in friends' group. When youth offenders attended a pharmacist-based smoking cessation program, they were persuaded to stop smoking. But when they return to their houses, the presence of other smokers in the family and/or in friends'group may induce them return to smoke easily.

4. One of the confounding variable was the willingness to quit attempt or the motivational level. Because one-third of youth offenders in the compulsory method were not willing to quit smoking, it was more difficult to motivate them to try to quit than those who in the voluntary method.

5. There were high number of youth offenders who did not come to Thanyarak Institute themselves, counseling was given by telephone. Then the scores of TSCHRQOL, general knowledge of cigarette smoking, nicotine withdrawal symptoms and cravings were assessed only those who continued attending a pharmacist-based smoking cessation program (N = 50 in compulsory method, and 5 in voluntary method at 24 weeks), which may give bias results toward a less favorable outcome.

Recommendations

Future studies should include:

1. Scheduling frequent follow-up visits at initial periods to motivate youths who are not ready to quit to change their mind or make a decision to quit before setting the quit date.

2. Determining the effectiveness between one by one counseling and group counseling for youth offenders in a pharmacict-based smoking cessation program.

3. Using other youth's groups such as students, neophytes, etc. and determining the effectiveness of compulsory method in each youth group.

4. Determining abstinence rate of youth offenders when using other pharmacotherapies such as nicotine replacement therapy, herbs, etc.

5. Increasing sample size to detect statistically difference between compulsory and voluntary methods

References

[1] Kennedy, D.T., and Chang, Z.G. 2000. Smoking Cessation. In Herfindal E.T., Gourley D.R., (eds), Textbook of Therapeutics Drug and Disease Management. pp.1343-56. Philadelphia: Lippincott Williams&Wilkin.

[2] Action On Smoking and Health Thailand. 2005. Deterioration from smoking [Online]. Available from: http://www.ashthailand.or.th/th/content_image/informationcenter/74. pdf. [2007, Sep 9].

[3] World Health Organization. 2008. WHO report on the global tobacco epidemic 2008: the MPOWER Package. Geneva, Switzerland: WHO.

[4] National Statistical Office. 2007. Decrement of Thai smoking rates [Online]. Available from: http://www.newswit.com/news/ss/. [2007, Sep 9].

[5] World Health Organization. 2008. World No Tobacco Day 2008: Tobacco-Free Youth 2008 [Online]. Available from: http://www.wpro.who.int/sites/tfi/wntd/WNTD+2008.htm [2008, Jul 27].

[6] Ministry of Culture. 2006. Thai children's moral construction planing [Online]. Available from: http://www.moe.go.th/jarawporn/planning_ja49.html [2007, Aug 22].

[7] Thaipost Editors. 2005. Alcohol addiction in Thai youth [Online]. Available from: http://www.thaipost.net/index.asp?bk=xcite&post_date=10/Aug/2548&news_id=111246&cat_id=200100 [2007, Aug 22].

[8] Sirichotiratana, N., et al. 2008. Linking global youth tobacco survey (GYTS) data to the WHO framework convention on tobacco control: The case for Thailand.

[9] Warner, K.E. 1984. Toward a Global Strategy to Combat Smoking: The 5th World Conference on Smoking and Health. J Public Health Policy 5(1): 28-39.

[10] Paavola, M., Vartiainen, E., and Haukkala, A. 2004. Smoking, Alcohol Use, and Physical Activity: A 13-Year Longitudinal Study Ranging from Adolescence into Adouthood. J Adolesc Health 35: 238-44.

[11] Thom, B. 2003. Risk-taking behaviour in men: substance use and gender. London: Health Development Agency.

[12] Wongwiwatthananukit, S. 2006. Effectiveness of vernonia cinerea for smoking cessation. Asia Hotel, Bangkok: Thai Pharmacy Network for Tobacco Control.

[13] Fiore, M.C., et al. 2008. Treating tobacco use and dependence: 2008 update. clinical practice guideline: U.S. Department of Health and Human Services.

[14] Dent, L.A., Harris, K.J., and Noonan, C.W. 2007. Tobacco Interventions Delivered by Pharmacists: A Summary and Systematic Review. Pharmacol Ther 27(7): 1040-51.

[15] Howard-Pitney, B., Killen, J.D., and Fortmann, S.P. 1999. Quitting chew: results from a randomized trial using nicotine patches. Exp Clin Psychopharmacol 7: 362-71.

[16] Maguire, T.A., McElnay, J.C., and Drummond, A. 2001. A randomized controlled trial of a smoking cessation intervention based in community pharmacies. Addiction 96(2): 325-31.

[17] Vial, R.J., Jones, T.E., Ruffin, R.E., and Gilbert, A.L. 2002. Smoking cessation program using nicotine patches: linking hospital to the community. J Pharm Pract Res 32: 57-62.

[18] Sonderskov, J., Olsen, J., Sabroe, S., Meillier, L., and Overvad, K. 1997. Nicotine Patches in Smoking Cessation: A Randomized Trial among Over-the-Counter Customers in Denmark. Epidemiol 145(4): 309-18.

[19] Sinclair, H.K., Bond, C.M., Lennox, A.S., Silcock, J., Winfield, A.J., and Donnan, P.T. 1998. Training pharmacists and pharmacy assistants in the stage-of-change model of smoking cessation: a randomised controlled trial in Scotland. Tob Control 7: 253-61.

[20] Wongwiwatthananukit, S. 2007. Pharmacotherapies in smoking cessation. In Textbook of health, cigarette controlling for health care team. pp.465-90. Bangkok: Thai Pharmacy Network for Tobacco Control.

[21] Wongwiwatthananukit, S. 2005. Role of pharmacist in term of helping patients quit smoking. Medicthai 5-20.

[22] Wongwiwatthananukit, S. 2003. Role of pharmacists in smoking cessation program. In Jindavijag, B., (eds) Ambulatory pharmaceutical care. 1st ed. pp.153-74. Bangkok: Thai Hospital Pharmacist Association.

[23] Wilson, D., Parson, J., and Wakefield, M. 1999. The health-related quality-of-life of never smokers, ex-smokers, and light, moderate, and heavy smokers. Prev Med 29(3): 139-44.

[24] Tillmann, M., and Silcock, J. 1997. A comparison of smokers' and ex-smokers' health-related quality of life. J Public Health Med 19(3): 268-73.

[25] Zillich, A.J., Ryan, M., Adams, A., Yeager, B., and Farris, K. 2002. Effectiveness of a pharmacist-based smoking-cessation program and its impact on quality of life. Pharmacotherapy 22(6): 759-65.

[26] Stotts, R.C., Roberson, P.K., Hanna, E.Y., Jones, S.K., and Smith, C.K. 2003. A randomised clinical trial of nicotine patches for treatment of spit tobacco addiction among adolescents. Tob Control 12(suppl IV): iv11-iv5.

[27] Killen, J.D., et al. 2004. Randomized clinical trial of the efficacy of bupropion combined with nicotine patch in the treatment of adolescent smokers. J Consult Clin Psychol 72(4): 729-35.

[28] Hurt, R.D., Sachs, D.P., Glover, E.D., Offord, K.P., Johnston, J.A., and Dale, L.C. 1997. A comparison of sustained-release bupropion and placebo for smoking cessation. N Engl J Med 337(17): 1195-202.

[29] Hurt, R.D., Croghan, G.A., Beede, S., Wolter, T.D., Croghan, I.T., and Patten, C. 2000. Nicotine patch therapy in 101 adolescent smokers: efficacy, withdrawal symptom relief, and carbon monoxide and plasma cotinine levels. Arch Pediatr Adolesc Med 154(1): 31-7.

[30] Hall, S.M., Humfleet, G.L., Reuss, V.I., Munoz, R.F., Hartz, D.T., and Maude-Griffen, R. 2002. Psychological intervention and antidepressant treatment in smoking cessation. Arch Gen Psychiatry 59(10): 930-6.

[31] Garrison, M.M., Christakis, D.A., Ebel, B.E., Wiehe, S.E., and Rivara, F.P. 2003. Smoking cessation interventions for adolescents. Am J Prev Med 25(4): 363-7.

[32] Kennedy, D.T., and Small, R.E. 2002. Development and implementation of a smoking cessation clinic in community pharmacy practice. J Am Pharm Assoc 42(1): 83-92.

[33] Kealey, K.A., et al. 2007. Overcoming barriers to recruitment and retention in adolescent smoking cessation. Nicotine Tob Res 9(2): 257-70.

[34] Joffe, A., Ash, S., and Sheng, P. 2005. Randomized trial of single versus multi-session group smoking cessation intervention for adolescent. J Adolesc Health 36(2): 118.

[35] Sinha, D.N., and Roychowdhury, S. 2000. Tobacco use among students in West Bengal. Kolkata: Department of Epidemiology & Biostatistics Chittaranjan National Cancer Institute (CNCI).

[36] Gostin, L.O. 1991. Compulsory Treatment for Drug-Depemdent Persons: Justifications for a Public Health Approach to Drug Dependency. Milbank Q 69(4): 561-93.

[37] Naing, N.N., Ahmad, Z., Musa, R., Hamid, F.A., Ghazali, H., and Baker, M.A. 2004. Factors Related to Smoking Habits of Male Adolescents. Tob Induc Dis 2(3): 133-40.

[38] Jackson, N., and Prebble, A. 2002. Perceptions of smoking cessation : products and services among low income smokers. London: Health Development Agency.

[39] Harvey, C. 2004. Butt Out: A Report on the Issues of Teen Smoking [Online]. Available from: http://www.geoffwilsonmp.com/articles.php?id=1 [2007, Aug 22].

[40] Aldous, J. 2007. Smoking in movies may increase risk of teens becoming established smokers. Arch Pediatr Adolesc Med 161(9): 849-56.

[41] Supawongse, C. 1998. Smoking Behavior of Thai Youths Thailand [Online]. Available from: http://advisor.anamai.moph.go.th/factsheet/smoke.html [2007, Aug 22].

[42] West, R., Hajek, P., Stead, L., and Stapleton, J. 2005. Outcome criteria in smoking cessation trial: proposal for a common standard. Addiction 100(3): 299-303.

[43] Wongwiwatthananukit, S., Dhumma-Upakorn, R., and Naktuan, T. 2005. Development and testing of Thai smoking cessation quality of life assessment instrument. Journal of Health Research 19(1): 49-73.

[44] Kotylar, M., and Hatsukami, D.K. 2002. Managing Nicotine Addiction. J Dent Educ 66(9): 1061-73.

[45] Hudmon, K.S., Kroon, L.A., and Corelli, R.L. 2006. Smoking Cessation. In Young, L.L., (eds), Handbook of Nonprescription drugs, An Interactive Approach to self-care. pp.1021-44. Washington, DC: the American Pharmacists Association.

[46] Benowitz, N.L. 1999. Nicotine addiction. Prim Care 26(3): 611-31.

[47] Fant, R.V., Owen, L.L., and Henningfield, J.E. 1999. Nicotine replacement therapy. Prim Care 26(3): 633-52.

[48] Schneider, N.G., Olmstead, R.E., Franzon, M.A., and Lunell, E. 2001. The nicotine inhaler: clinical pharmacokinetics and comparison with other nicotine treatments. Clin Pharmacokinet 40(9): 661-84.

[49] Hajek, P., West, R., Foulds, J., Nilsson, F., Burrows, S., and Meadow, A. 1999. Randomized comparative trial of nicotine polacrilex, a transdermal patch, nasal spray, and an inhaler. Arch Intern Med 159(17): 2033-8.

[50] Dempsey, D.A., and Benowitz, N.L. 2001. Risks and benefits of nicotine to aid smoking cessation in pregnancy. Drug Saf 24(4): 277-322.

[51] Benowitz, N.L., and Dempsey, D.A. 2004. Pharmacotherapy for smoking cessation during pregnancy. Nicotine Tob Res 6(suppl 2): S189-S202.

[52] Coleman, T., Britton, J., and Thornton, J. 2004. Nicotine replacement therapy in pregnancy. BMJ 328(7446): 965-6.

[53] National PBM Drug monograph. 2006. Varenicline (Chantix™). In VHA Pharmacy Benefits Management Strategic Healthcare Group and the Medical Advisory Panel, Drug monograph.

[54] Jorenby, D.E., et al. 2006. Efficacy of varenicline, an α4β2 nicotinic acetylcholine receptor partial agonist, vs sustained-release bupropion and placebo for smoking cessation. JAMA 296(1): 56-63.

[55] Gonzales, D., et al. 2006. Verenicline, and alpha-4-beta-2 nicotinic acetylcholine receptor partial agonist, vs sustained release bupropion and placebo for smoking cessation: a randomized controlled trial. JAMA 296(1): 47-55.

[56] Montakantikul, P. 2003. Clinical practice guideline for smoking cessation. Mahidol University Journal of Pharmaceutical Sciences 30(1): 1-8.

[57] Silagy, C., Lancaster, T., Stead, L., Mant, D., and Fowler, G. 2004. Nicotine replacement therapy for smoking cessation (Review). In The Cochrane Library, Issue 3. pp.1-109. chichester, UK: Wiley.

[58] Thorndike, A.N., Ferris, T.G., Stafford, R.S., and Rigotti, N.A. 1999. Rates of U.S. physicians counseling adolescents about smoking. J Natl Cancer Inst 91(21): 1857-62.

[59] Burt, R.D., and Peterson, A.V. 1998. Smoking cessation among high school seniors. Prev Med 27: 319-27.

[60] Prochaska, J.O., and DeClemente, C.C. 1984. The transtheoretical approach: crossing traditional boundaries of therapy. Homewood: Dow Jones-Irwin.

[61] Margolis, J.A., Meshack, A.F., McAlister, A.L., Boye-Doe, H., Simpson, L., and Hu, S. 2002. Smoking cessation activities by pharmacists in east Texus. J Am Pharm Assoc 42: 508-9.

[62] Hudmon, K.S., Prokhorov, A.V., and Corelli, R.L. 2006. Tobacco cessation counseling: pharmacists' opinions and practices. Patient Educ Couns 61: 152-60.

[63] Hudmon, K.S., et al. 2004. Training future pharmacists at a minority educational situation: evaluation of the Rx for change tobacco cessation training program. Cancer Epidemiol Biomarkers Prev 13: 477-81.

[64] Ferro, L.A., et al. 1998. Collaborative practice agreements between pharmacists and physicians. J Am Pharm Assoc 38: 655-64.

[65] Dent, L.A., Harris, K.J., and Noonan, C.W. 2009. Randomized trial assessing the effectiveness of a pharmacist-delivered program for smoking cessation. Ann Pharmacother 43: 194-201.

[66] The global youth tobacco survey collaborative group. 2002. Tobacco use among youth: a cross country comparison. Tob Control 11(3): 252-70.

[67] Grimshaw, G.M., and Stanton, A. 2007. Tobacco cessation interventions for young people (Review). In The Cochrane Library, Issue 4. pp.1-36. chichester, UK: Wiley.

[68] Sussman, S., Lichtman, K., Ritt, A., and Pallonen, U.E. 1999. Effects of thirty-four adolescent tobacco use cessation and prevention trials on regular users of tobacco products. Subst Use Misuse 34(11): 1469-503.

[69] Kandel, D.E., and Chen, K. 2000. Extent of smoking and nicotine dependence in the United States 1991-1993. Nicotine Tob Res 2: 263-74.

[70] Pierce, J.P., and Gilpin, E.A. 2002. Impact of over-the-counter sales on effectiveness of pharmaceutical aids for smoking cessation. JAMA 288(10): 1260-4.

[71] McDonald, P., Colwell, B., Backinger, C.L., Husten, C., and Maule, C.O. 2003. Better practices for youth tobacco cessation: evidence of review panel. Am J Health Behav 27(Suppl 2): S144-S58.

[72] Hanson, K., Allen, S., Jensen, S., and Hatsukami, D. 2003. Treatment of adolescent smokers with the nicotine patch. Nicotine Tob Res. 5(4): 515-26.

[73] Moolchan, E.T., et al. 2005. Safety and efficacy of the nicotine patch and gum for the treatment of adolescent tobacco addiction. Pediatrics 115(4): e407-e14.

[74] Smith, T.A., et al.1996. Nicotine patch therapy in adolescent smokers. Pediatrics 98(4): 659-67.

[75] Franken, F.H., Pickworth, W.B., Epstein, D.H., and Moolchan, E.T. 2006. Smoking rates and topography predict adolescent smoking cessation following treatment with nicotine replacement therapy. Cancer Epidemiol Biomarkers Prev 15(1): 154-7.

[76] Upadhyaya, H.P., Brady, K.T., and Wang, W. 2004. Bupropion SR in adolescents with comorbid ADHD and nicotine dependence: a pilot study. J Am Acad child Adolesc Psychiatry 43(2): 199-205.

[77] Sussman, S. 2002. Effects of sixty six adolescent tobacco use cessation trials and seventeen prospective studies of self-initiated quitting. Tob Induc Dis 1(1): 35-81.

[78] Soria, R., Legido, A., Escolano, C., Yeste, A.L., and Montoya, J. 2006. A randomised controlled trial of motivational interviewing for smoking cessation. Br J Gen Pract 56: 768-74.

[79] Backinger, C.L., et al. 2003. Improving the future of youth smoking cessation. Am J Health Behav 27(Suppl 2): S170-S84.

[80] Hatsukami, D., and Hughes, J.R. 1986. Signs and symptoms of tobacco withdrawal. Arch Gen Psychiatry 43: 289-94.

[81] Cappelleri, J., Bushmakin, A., Baker, C., Merikle, E., Olufade, A., and Gilbert, D. 2005. Revealing the multidimensional framework of the Minnesota Nicotine Withdrawal Scale. Curr Med Res Opin 21(12): 749-60.

[82] Cox, L.S., Tiffany, S.T., and Christen, A.G. 2001. Evaluation of the brief questionnaire of smoking urges (QSU-brief) in laboratory and clinical settings. Nicotine Tob Res 3(1): 7-16.

[83] Department of juvenile observation and protection. 2008. An annual case report in 2008 [Online]. Available from: www.djop.moj.go.th. [2009, Feb 10].

[84] Kariyaphon, A. 2008. An introduction to the role of the Juvenile and Family Courts of Thailand. Bangkok: The Central Juvenile and Family Court.

[85] Ministry of labour. 2008. Labour Protection Act [Online]. Available from: www.mol.go.th [2009 Feb 10].

[86] Wattanathanyakrum, S. 2005. Cigarettes. In Werachai, W., Pattrakorn, A., Lakhanapichonchach, L., Punjabust, C., Khimsoungnern, N., (eds), Textbook of addicted medicine. pp. 450-68. Bangkok: Thai Veterans Assistance Foundation.

[87] Ruangkanchanasetr, S., Plitponkarnpim, A., Hetrakul, P., and Kongsakon, R. 2005. Youth risk behavior survey: Bangkok, Thailand. J Adolesc Health 36: 227-35.

[88] Kandel, D.B., Yamaguchi, K., and Chen, D. 1992. Stages of progression in drug involvement from adolescence to adulthood: Further evidence for the gateway theory. J Stud Alcohol 53: 447-57.

[89] Burton, S., and Tiffany, S.T. 2002. The effect of alcohol consumption on craving to smoke. Addiction 92(1): 15-26.

[90] Castrucci, B., and Gerlach, K. 2006. Understanding the association between authoritative parenting and adolescent smoking. Matern Child Health J 10(2): 217-24.

[91] Soteriades, E.S., and DiFranza, J.R. 2003. Parent's socioeconomic status, adolescents' disposable income, and adolescents' smoking status in Massachusetts. Am J Public Health 93(7): 1155-60.

[92] Jantarapaijit, J. 1997. Reason for smoking of upper secondary schools students in Chiang Mai province. Master’s thesis. Educational Psychology and Guidance. Chiang Mai University.

[93] Kandel, D.B., Kiros, G.E., Schaffran, C., and Hu, M.C. 2004. Racial/ethnic differences in cigarette smoking initiation and progression to daily smoking: a multilevel analysis. Am J Public Health 94(1): 128-35.

[94] Ennett, S.T., and Bauman, K.E. 1993. Peer group structure ans adolescent cigarette smoking: a social network analysis. J Health Soc Behav 34(3): 226-36.

[95] Distefan, J.M., Gilpin, E.A., Choi, W.S., and Pierce, J.P. 1998. Parental influences predict adolescent smoking in the United States, 1989-1993. J Adolesc Health 22(6): 466-74.

[96] Kleinjan, M., Engels, R., Van-Leeuwe, J., Brug, J., Van-Zundert, R., and Van-Eijnden, R. 2009. Mechanisms of adolescent smoking cessation: roles of readiness to quit, nicotine dependence, and smoking of parents and peers. Drug Alcohol Depend 99: 204-14.

[97] Prokhorov, A.V., Hudmon, K.S., Moor, C.A., Kelder, S.H., Conroy, J.L., and Ordway, N. 2001. Nicotine dependence, withdrawal symptoms, and adolescents' readiness to quit smoking. Nicotine Tob Res 3: 151-5.

[98] Help with Smoking. 2005. Nicotine withdrawal symptoms - information on possible withdrawal symptoms [Online]. Available from: http://www.helpwithsmoking.com/nicotine-withdrawal.php [2009, Mar 29].

[99] Wagenknecht, L., et al. 1990. Cigarette smoking behavior is strongly related to educational status: the CARDIA study. Prev Med 19(2): 158-69.

[100] Townsend, J., Roderick, P., and Cooper, J. 1994. Cigarette smoking by socioeconomic group, sex, and age: effects of price, income, and health publicity. BMJ 309: 923-7.

[101] Ma, J., Betts, N.M., and Hampl, J.S. 2000. Clustering of lifestyle behaviors: the relationship between cigarette smoking, alcohol consumption, and dietary intake. Am J Health Promot 15(2): 107-17.

[102] Batel, P., Pessione, F., Maitre, C., and Rueff, B. 1995. Relationship between alcohol and tobacco dependencies among alcoholics who smoke. Addiction 90: 977-80.

[103] Everett, S.A., Warren, C.W., Sharp, D., Kann, L., Husten, C.G., and Crossett, L.S. 1999. Initiation of cigarette smoking and subsequent smoking behavior among U.S. high school students. Prev Med 29(5): 327-33.

[104] Breslau, N., and Peterson, E.L. 1996. Smoking cessation in young adults: age at initiation of cigarette smoking and other suspected influences. Am J Public Health 86(2): 214-20.

[105] Gutschoven, K., and Bulck, J.V. 2004. Television viewing and smoking volume in adolescent smokers: a cross-sectional study. Prev Med 39(6): 1093-8.

[106] Gidwani, P.P., Sobol, A., DeJong, W., Perrin, J.M., and Gortmaker, S.L. 2002. Television viewing and initiation of smoking among youth. Pediatrics 110(3): 505-8.

[107] Blow, L., Leicester, A., and Windmeijer, F. 2005. Parental income and children's smoking behavior: evidence from the British household panel survey. The Institute for Fiscal Studies, London, UK.

[108] Tyas, S.L., and Pederson, L.L. 1998. Psychosocial factors related to adolescent smoking: a critical review of the literature Tob Control 7: 409-20.

[109] Homsin, P. 2006. Predictors of smoking uptake among Thai male adolescents: early smoking stages. Doctor’s thesis. Nursing. Chiang Mai University.

[110] Bauman, K.E., Fisher, L.A. 1986. On the measurement of friend behavior in research on friend influence and selection: findings from longitudinal studies of adolescent smoking and drinking. J Youth Adolesc 15(4): 345-53.

APPENDICES

APPENDIX A

แบบบันทึกประวัติทั่วไปและประวัติการสูบบุหรี่

วันที่บันทึก..... เลขที่ .....

ชื่อ-สกุล.....วันเดือนปีที่เกิด.....อายุ.....ปี HN.……

ที่อยู่.....

....โทรศัพท์.....

ชื่อผู้ปกครองที่สามารถติดต่อได้.....โทรศัพท์.....

I. ข้อมูลทั่วไป

1. เพศ ○หญิง ○ ชาย
2. น้ำหนัก….....กก. ส่วนสูง.....ซม. ความดันโลหิต..... มม.ปรอท
3. คดีที่กระทำความผิด .....
4. โทษที่ได้รับ.....
5. การศึกษา ○ ไม่ได้เรียน ○ ประถมศึกษา ○ ม.ต้น .
   ○ ม.ปลาย/ปวช ○ อนุปริญญา/ปวส.
6. อาศัยอยู่กับ ....
7. มีพี่น้อง ..... คน ตัวท่านเป็นลูกคนที่ .....
8. รายได้เฉลี่ยต่อเดือนของท่าน ..... บาท
9. โรคประจำตัวอื่น ๆ…...……..
10. ดื่มแอลกอฮอล์ ○ดื่ม ปริมาณที่ดื่มต่อวัน.....ขวด/แก้ว/แบน ○ไม่ดื่ม
11. ระดับการศึกษาของผู้ปกครอง ○ ต่ำกว่าปริญญาตรี ○ ปริญญาตรี ○ สูงกว่าปริญญาตรี
12. สถานภาพการสมรสของบิดามารดา ○ อยู่ด้วยกัน ○ แยกกันอยู่ ○ บิดา/มารดา เสียชีวิต
13. บิดาประกอบอาชีพ.....
14. มารดาประกอบอาชีพ..... .....
15. รายได้เฉลี่ยต่อเดือนของผู้ปกครอง ..... บาท

II. ประวัติการสูบบุหรี่

16. อายุเมื่อเริ่มสูบบุหรี่.....ปี 17. จำนวนบุหรี่ที่สูบต่อวัน.....มวน
18. ยี่ห้อบุหรี่ที่นิยมสูบ ....
19. ซื้อบุหรี่จากที่ไหน.....
20. บุคคลอื่นในบ้านที่สูบบุหรี่.....จำนวน.....คน
21. จำนวนเพื่อนสนิทของท่านที่สูบบุหรี่..... คน
22. ความพยายามที่เคยเลิกบุหรี่ จำนวน.....ครั้ง ระยะเวลาที่เคยเลิกบุหรี่ได้นานที่สุด.....วัน

23. วิธีที่ใช้ในการเลิกบุหรี่ ○ เลิกสูบด้วยตนเองทันที ○ ค่อยๆ ลดปริมาณ ○ ใช้บูโพรพิออน
○ ใช้แผ่นนิโคติน ○ ใช้หมากฝรั่งนิโคติน ○ ใช้ยาน้ำอมอดบุหรี่ ○ อื่นๆ .....
24. สาเหตุที่ต้องกลับมาสูบอีก.....
25. เคยได้รับการตักเตือนเรื่องการสูบบุหรี่หรือไม่ ○ ไม่เคย ○ เคย โดย.....
26. ผลจากการถูกลงโทษเนื่องจากการสูบบุหรี่ ○ งดสูบ ○ สูบน้อยลง
○ สูบเท่าเดิม ○ สูบมากขึ้น
27. ปัจจัยใดที่ท่านคิดว่ามีผลทำให้ท่านสูบบุหรี่

○ อยากทดลองสูบ	○ เพื่อนชวนให้สูบ
○ ทำให้เกิดความสนุกสนาน	○ สูบตามบุคคลในครอบครัว
○ เพื่อความโก้เก๋	○ สูบตามพี่น้อง
○ เพื่อพักผ่อนคลายความเครียด	○ สูบตามผู้ใหญ่
○ เพราะผิดหวังในความรัก	○ เลียนแบบจากการโฆษณา
○ เพราะผิดหวังในการเรียน	○ เลียนแบบดารา/นักร้อง
○ เพื่อเพิ่มสมาธิในการเรียน/การทำงาน	○ สูบตามละครโทรทัศน์/ภาพยนตร์
○ เพื่อทำให้สมองปลอดโปร่ง	○ สูบเพราะต้องการการยอมรับจากเพื่อน
○ เพื่อสร้างความมั่นใจให้กับตนเอง	○ สูบเพราะต้องการการยอมรับว่าเป็นผู้ใหญ่
○ เพื่อแก้ความเขินอายหรือประหม่า	○ อื่นๆ .....
○ อื่นๆ	○ อื่นๆ .....

28. ใน 1 วัน ท่านดูทีวีหรือไม่ ○ ไม่ดู ○ ดู วันละเฉลี่ย ..... ชั่วโมง
29. ท่านรู้สึกอย่างไรต่อคำเตือนบนหน้าซองบุหรี่ ○ มีผลต่อการสูบบุหรี่ เนื่องจาก.....
○ ไม่มีผลต่อการสูบบุหรี่ เนื่องจาก.....
30. ท่านคิดว่า การวางบุหรี่จำหน่ายบนแผงตั้งโชว์กับการเก็บไว้ในที่มิดชิดแล้วขึ้นป้ายว่าที่นี่มีบุหรี่จำหน่าย มีผลต่อการซื้อบุหรี่หรือไม่ ○ มี ○ ไม่มี
31. ระดับเสพติดสารนิโคติน.....คะแนน
32. ระดับแรงจูงใจในการเลิกสูบบุหรี่.....
33. แบบทดสอบทำไมจึงติดบุหรี่อยู่ □..... ○..... △.....

APPENDIX B

วันที่บันทึก..... เลขที่.....

แบบทดสอบระดับการติดสารนิโคติน (Fagerstrom Test for Nicotine Dependence)

1. โดยปกติท่านสูบบุหรี่กี่มวนต่อวัน

☐ 10 มวนหรือน้อยกว่า (0) ☐ 11 – 20 มวน (1)

☐ 21 – 30 มวน (2) ☐ 31 มวนขึ้นไป (3)

2. หลังตื่นนอนตอนเช้าท่านสูบบุหรี่มวนแรกเมื่อไร

☐ ภายใน 5 นาทีหลังตื่นนอน (3) ☐ 6 -10 นาที หลังตื่นนอน (2)

☐ 31 – 60 นาที หลังตื่นนอน (1) ☐ มากกว่า 60 นาที หลังตื่นนอน (0)

3. ท่านสูบบุหรี่จัดในชั่วโมงแรกหลังตื่นนอน (สูบมากกว่าเวลาอื่นของวัน)

☐ ใช่ (1) ☐ ไม่ใช่ (0)

4. บุหรี่มวนไหนที่ท่านคิดว่าเลิกยากที่สุด

☐ มวนแรกในตอนเช้า (1) ☐ มวนอื่น ๆระหว่างวัน (0)

5. ท่านรู้สึกอึดอัด กระวนกระวาย หรือลำบากใจไหม ที่ต้องอยู่ในเขตปลอดบุหรี่ เช่น โรงภาพยนตร์ รถโดยสาร

☐ รู้สึก (1) ☐ ไม่รู้สึก (0)

6. ท่านคิดว่าท่านยังต้องสูบบุหรี่ แม้จะป่วยนอนพักตลอดในโรงพยาบาล

☐ ใช่ (1) ☐ ไม่ใช่ (0)

รวมคะแนน.....

- ระดับคะแนน < 7 บ่งชี้ว่า ผู้ป่วยมีการติดสารนิโคตินในระดับต่ำถึงปานกลาง
- ระดับคะแนน ≥ 7 บ่งชี้ว่า ผู้ป่วยมีการติดสารนิโคตินในระดับสูง

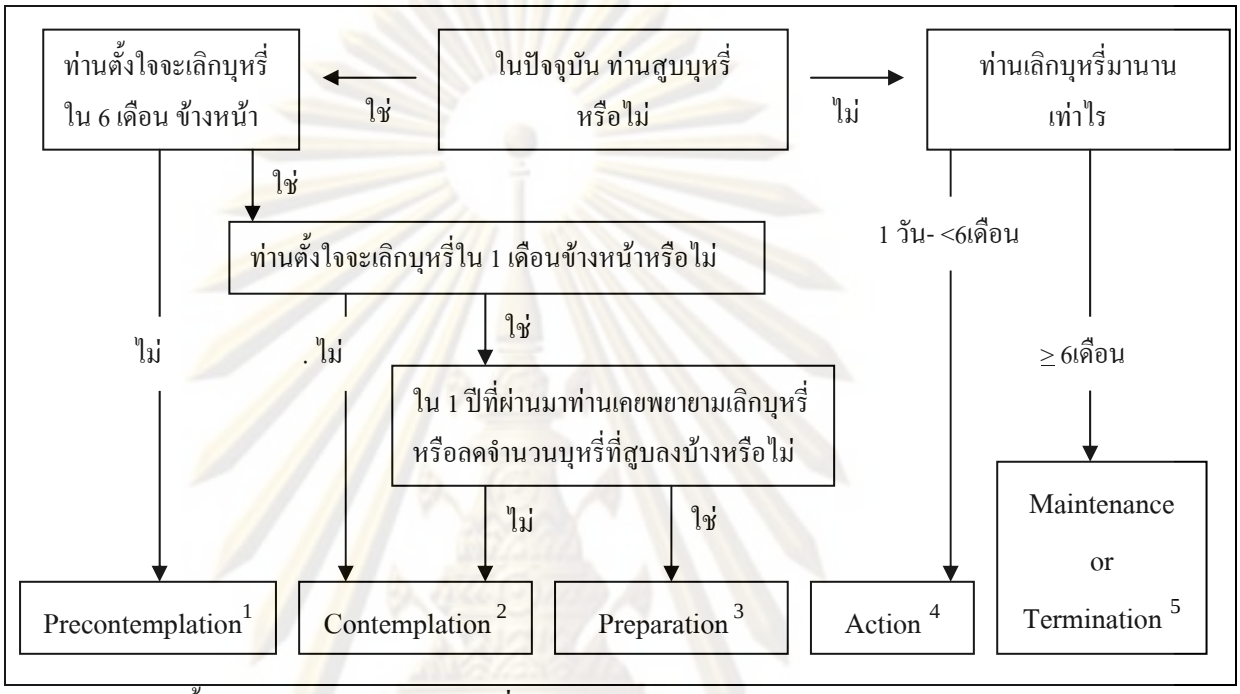
ที่มา : สุภกิจ วงศ์วิวัฒนกุล บทบาทของเภสัชกรในการช่วยเหลือผู้ป่วยให้เลิกบุหรี่ ใน: บุษบา จินดาวิจักษณ์, สุวัฒนา จุฬาวัฒนทล, ปรีชา มนทกานติกุล, เนติ สุขสมบูรณ์, บรรณาธิการ. ก้าวใหม่ของเภสัชกรงานบริบาลผู้ป่วยนอก.พิมพ์ครั้งที่ 1. กรุงเทพมหานคร:สมาคมเภสัชกรรมโรงพยาบาล(ประเทศไทย);2546. หน้า 153-74.

APPENDIX C

วันที่บันทึก..... เลขที่.....

คำถามสำหรับคัดกรองผู้สูบบุหรี่ตามระดับความต้องการเลิกบุหรี่ตามแบบจำลอง

Transtheoretical Model



ลำดับขั้นของความต้องการเลิกบุหรี่ใน The Transtheoretical Model (TTM) ประกอบด้วย 5 ลำดับ

1. Precontemplation Stage คือภาวะที่ผู้ป่วยไม่มีความตั้งใจจะเลิกบุหรี่ใน 6 เดือนข้างหน้า
2. Contemplation Stage คือภาวะที่ผู้ป่วยยังสูบบุหรี่อยู่ แต่มีความตั้งใจจะเลิกบุหรี่ใน 6 เดือนข้างหน้า โดยยังไม่มีการวางแผนที่แน่นอน ผู้ป่วยแสดงความลังเลในการเลิกบุหรี่และยังไม่พร้อมต่อการเปลี่ยนแปลงนี้
3. Preparation Stage คือภาวะที่ผู้ป่วยยังสูบบุหรี่อยู่ แต่มีความตั้งใจเลิกบุหรี่ใน 30 วัน และในอดีต 1 ปีที่ผ่านมา เคยมีความพยายามเลิกบุหรี่อย่างน้อย 1 ครั้ง ได้อย่างน้อย 24 ชั่วโมง
4. Action Stage คือภาวะที่ผู้ป่วยเริ่มหยุดสูบบุหรี่แล้วเป็นเวลา 1 วัน ถึง 6 เดือน
5. Maintenance Stage หรือ Termination คือภาวะที่ผู้ป่วยสามารถหยุดบุหรี่ได้อย่างน้อยเป็นเวลา 6 เดือน

ที่มา : ศุภกิจ วงศ์วิวัฒนนุกิจ บทบาทของเภสัชกรในการช่วยเหลือผู้ป่วยให้เลิกบุหรี่ ใน: บุษบา จินดาวิจักษณ์, สุวัฒนา จุฬาวัฒนทล, ปรีชา มนทกานติกุล, เนติ สุขสมบูรณ์, บรรณาธิการ. ก้าวใหม่ของเภสัชกรงานบริบาลผู้ป่วยนอก.พิมพ์ครั้งที่ 1. กรุงเทพมหานคร:สมาคมเภสัชกรรมโรงพยาบาล(ประเทศไทย);2546. หน้า 153-74.

APPENDIX D

วันที่บันทึก..... เลขที่.....

แบบทดสอบ " ทำไมคุณยังสูบบุหรี่อยู่? "

ข้อความใดที่ตรงกับคุณบ้าง (ทำเครื่องหมาย ☑ หน้าข้อที่เลือก)

☐ ☐ ฉันไม่สามารถอยู่ได้ถึงครึ่งวันโดยไม่สูบบุหรี่
☐ △ บางครั้งฉันพบว่าตัวเองกำลังสูบบุหรี่อยู่โดยจำไม่ได้ว่าฉันได้จุดมันตั้งแต่เมื่อไร
☐ ○ ฉันสูบบุหรี่เพราะมันช่วยให้ฉันคิดได้ดีขึ้น มีชีวิตชีวาขึ้น
☐ △ ฉันชอบที่จะมองควันบุหรี่เมื่อเวลาที่ฉันพ่นออกมา
☐ ☐ ฉันรู้สึกอยากสูบบุหรี่อย่างมากถ้าไม่ได้สูบมันมาประมาณ 2-3 ชั่วโมง
☐ ○ การสูบบุหรี่เป็นหนึ่งในสิ่งที่ทำให้ฉันพอใจในชีวิต
☐ △ ฉันมีความสุขในขั้นตอนการจุดบุหรี่ขึ้นมาสูบ เช่น การสัมผัสบุหรี่ และการได้จุดไฟแช็ค
☐ ☐ ฉันต้องการสูบบุหรี่ทันทีหลังจากที่ฉันตื่นนอนในตอนเช้า
☐ ○ เวลาที่ฉันรู้สึกสบาย ผ่อนคลายเป็นช่วงเวลาที่ฉันต้องการบุหรี่มากที่สุด
☐ △ ฉันชอบสูบบุหรี่ระหว่างช่วงพักของฉัน หรือหลังอาหาร
☐ ○ ฉันสูบบุหรี่เมื่อฉันโกรธ หรือทุกข์ใจ
☐ ☐ ถ้าฉันไม่ได้สูบบุหรี่ ฉันจะรู้สึกอ่อนเพลีย ดังนั้นฉันจึงต้องสูบมันอีก
☐ ○ การสูบบุหรี่ช่วยให้ฉันรู้สึกผ่อนคลายในเวลาที่ฉันตึงเครียด
☐ △ ฉันรู้สึกสบายและอุ่นใจมากกว่าเมื่อมีบุหรี่อยู่ในมือ
☐ ☐ เมื่อบุหรี่หมดมวน มันทำให้ฉันเกือบจะทนไม่ได้จนกว่าจะได้มันเพิ่ม

คะแนนรวม ☐..... ○..... △.....

สัญลักษณ์สี่เหลี่ยม ☐ แสดงถึง ผู้ป่วยติดสารนิโคตินในบุหรี่ ดังนั้นเมื่อผู้ป่วยหยุดสูบบุหรี่ จะทำให้เกิดอาการถอนยา เช่น ปวดศีรษะ หงุดหงิด กระวนกระวาย เป็นต้น

สัญลักษณ์วงกลม ○ แสดงถึง ผู้ป่วยมีภาวะจิตใจต้องพึ่งพาการสูบบุหรี่ เนื่องจากรู้สึกเครียดเป็นทุกข์หรือกระวนกระวายใจ เมื่อสูบบุหรี่แล้วทำให้รู้สึกสบายใจมีชีวิตชีวาขึ้น

สัญลักษณ์สามเหลี่ยม △ แสดงถึง ผู้ป่วยสูบบุหรี่เพราะความเคยชิน หรือมีการสร้างความสัมพันธ์ระหว่างกิจกรรมประจำวันกับการสูบบุหรี่ เช่นต้องสูบบุหรี่หลังรับประทานอาหารเสร็จหรือภายหลังดื่มกาแฟตอนเช้า หรือระหว่างโทรศัพท์ เป็นต้น

ที่มา : ศุภกิจ วงศ์วิวัฒนนุกิจ บทบาทของเภสัชกรในการช่วยเหลือผู้ป่วยให้เลิกบุหรี่ ใน: บุษบา จินดาวิจักษณ์, สุวัฒนา จุฬาวัฒนทล, ปรีชา มนทกานติกุล, เนติ สุขสมบูรณ์, บรรณาธิการ. ก้าวใหม่ของเภสัชกรงานบริบาลผู้ป่วยนอก.พิมพ์ครั้งที่ 1. กรุงเทพมหานคร:สมาคมเภสัชกรรมโรงพยาบาล(ประเทศไทย);2546. หน้า 153-74.

APPENDIX E

แบบบันทึกติดตามการเลิกบุหรี่

ชื่อ-นามสกุล…… HN…….. อายุ……...ปี

เลขที่……วันที่เข้าโปรแกรม…… วันกำหนดเลิกบุหรี่……..

ครั้งที่	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
สัปดาห์ที่	**0**	**2**	**4**	**8**	**12**	**16**	**20**	**24**
วันที่								
น้ำหนัก (kg)								
Urine cotinine								
ความรู้เกี่ยวกับบุหรี่								
Quality of life ด้านความเป็นอยู่ทั่วไป ด้านความพึงพอใจ ด้านการควบคุมตนเอง ด้านจิตใจและอารมณ์ **รวม**								
วันนัดครั้งต่อไป								

<u>ปัญหาที่เกิดขึ้นและการแก้ไข</u>

APPENDIX F

แบบประเมินคุณภาพชีวิตด้านสุขภาพในคนไทยที่เลิกบุหรี่

คำชี้แจง

คำถามเหล่านี้เป็นคำถามที่เกี่ยวข้องกับความเป็นอยู่และความรู้สึกของท่านในช่วง 1 สัปดาห์ที่ผ่านมา คำถามเหล่านี้ไม่มีถูกหรือผิด โปรดตอบคำถามทุกคำถาม โดย ○ ล้อมรอบหมายเลขคำตอบตามความเป็นจริงที่ใกล้เคียงกับตัวท่านมากที่สุดเพียงข้อเดียว

วันที่ประเมิน	ภาวะการสูบบุหรี่ ○ สูบ ○เลิกบุหรี่.....สัปดาห์/เดือน		
ชื่อผู้ประเมิน		HN	เลขที่

1. ข้อใดตรงกับความเป็นอยู่หรือการดำรงชีวิตประจำวันของท่าน **ในช่วง 1 สัปดาห์ที่ผ่านมา?**

ในช่วง 1 สัปดาห์ที่ผ่านมา	ไม่เคยเลย	นานๆครั้ง	บางครั้ง	บ่อยๆ	ตลอดเวลา
1. ฉันเหนื่อยง่ายเมื่อออกกำลังกายหรือทำงานที่ต้องออกแรงมาก เช่น เล่นกีฬาที่ต้องใช้แรงมากๆ ยกของหนักๆ	1	2	3	4	5
2. ฉันเหนื่อยง่ายเมื่อทำงานที่ต้องใช้แรงปานกลาง เช่น เลื่อนโต๊ะ รดน้ำต้นไม้ ซักผ้าด้วยตัวเอง 8-10 ชิ้น	1	2	3	4	5
3. ฉันเหนื่อยง่ายเมื่อเดินขึ้นบันไดหลายชั้นติดต่อกัน	1	2	3	4	5
4. เมื่อเข้านอนตอนกลางคืน ฉันมักนอนหลับยาก	1	2	3	4	5
5. ฉันรู้สึกเบื่ออาหาร	1	2	3	4	5
6. ฉันรู้สึกหงุดหงิดง่าย	1	2	3	4	5
7. ฉันรู้สึกโกรธง่าย	1	2	3	4	5
8. ฉันรู้สึกว่าอารมณ์แปรปรวนง่าย	1	2	3	4	5
9. ฉันรู้สึกเศร้าซึม	1	2	3	4	5
10. ฉันรู้สึกตึงเครียด	1	2	3	4	5
11. ฉันรู้สึกท้อแท้และหดหู่ใจ	1	2	3	4	5
12. ฉันรู้สึกเซ็งและเบื่อ	1	2	3	4	5
13. ฉันรู้สึกหมดเรี่ยวแรง	1	2	3	4	5

โปรดพลิกหน้าถัดไป

ในช่วง 1 สัปดาห์ที่ผ่านมา	ไม่เคยเลย	นานๆครั้ง	บางครั้ง	บ่อยๆ	ตลอดเวลา
14. ฉันรู้สึกเหนื่อยใจ	1	2	3	4	5
15. ฉันชอบอยู่ตามลำพัง ไม่อยากพบผู้คน	1	2	3	4	5
16. ฉันหลีกเลี่ยงการไปร่วมงานสังคมหรือสังสรรค์	1	2	3	4	5
17. ฉันมีอาการมึนงงหรือเวียนศีรษะ	1	2	3	4	5
18. ฉันมีอาการอ่อนเพลีย	1	2	3	4	5
19. ฉันรู้สึกมีชีวิตชีวา กระปรี้ประเปร่า	1	2	3	4	5
20. ฉันรู้สึกว่าตนเองเป็นคนที่มีความสุขคนหนึ่ง	1	2	3	4	5
21. ฉันรู้สึกหิวบุหรี่เป็นอันมาก	1	2	3	4	5
22. ฉันรู้สึกหมกมุ่นครุ่นคิดถึงการสูบบุหรี่	1	2	3	4	5
23. ฉันรู้สึกทรมานใจจากการที่ฉันอยากสูบบุหรี่แต่ไม่ได้สูบ	1	2	3	4	5
24. ปัญหาทางจิตใจและอารมณ์ (เช่น หงุดหงิด เศร้าซึม เครียด เซ็ง เบื่อ วิตกกังวลหรืออื่นๆ) มีผลกระทบต่อกิจกรรมต่างๆตามปกติที่ฉันทำร่วมกับ**ครอบครัว**	1	2	3	4	5
25. ปัญหาทางจิตใจและอารมณ์ (เช่น หงุดหงิด เศร้าซึม เครียด เซ็ง เบื่อ วิตกกังวลหรืออื่นๆ) มีผลกระทบต่อกิจกรรมต่างๆตามปกติที่ฉันทำร่วมกับ**เพื่อนฝูง**	1	2	3	4	5

2. **ในช่วง 1 สัปดาห์ที่ผ่านมา** ท่านมีความรู้สึกต่อไปนี้ **มากน้อยเพียงใด?**

ในช่วง 1 สัปดาห์ที่ผ่านมา	ไม่เลย	น้อย	ปานกลาง	ค่อนข้างมาก	มาก
26. ฉันวิตกกังวลว่าอาจจะเลิกบุหรี่ไม่สำเร็จ	1	2	3	4	5
27. ฉันวิตกกังวลกับการมีน้ำหนักตัวเพิ่มขึ้นหลังจากการเลิกบุหรี่	1	2	3	4	5
28. ฉันวิตกกังวลว่าการรับประทานอาหารที่เพิ่มขึ้นหลังจากการเลิกบุหรี่จะส่งผลเสียต่อสุขภาพ	1	2	3	4	5

โปรดพลิกหน้าถัดไป

ในช่วง 1 สัปดาห์ที่ผ่านมา	ไม่เลย	น้อย	ปานกลาง	ค่อนข้างมาก	มาก
29. ฉันรู้สึกว่าตัวเองมีคุณค่าสำหรับครอบครัว	**1**	**2**	**3**	**4**	**5**
30. ฉันรู้สึกภูมิใจในตนเอง	**1**	**2**	**3**	**4**	**5**
31. ฉันรู้สึกนับถือตนเอง	**1**	**2**	**3**	**4**	**5**
32. ฉันมีความเชื่อมั่นในตนเอง	**1**	**2**	**3**	**4**	**5**
33. ฉันพอใจในความสัมพันธ์ระหว่างฉันกับสมาชิกในครอบครัว	**1**	**2**	**3**	**4**	**5**
34. ฉันพอใจในความสัมพันธ์ระหว่างฉันกับเพื่อนฝูง	**1**	**2**	**3**	**4**	**5**
35. ปัญหาทางจิตใจและอารมณ์ (เช่น หงุดหงิด เศร้าซึม เครียด เซ็ง เบื่อ วิตกกังวลหรืออื่นๆ) มีผลกระทบต่อกิจกรรมต่างๆตามปกติที่ฉันทำร่วมกับ**ครอบครัว**	**1**	**2**	**3**	**4**	**5**
36. ปัญหาทางจิตใจและอารมณ์ (เช่น หงุดหงิด เศร้าซึม เครียด เซ็ง เบื่อ วิตกกังวลหรืออื่นๆ) มีผลกระทบต่อกิจกรรมต่างๆตามปกติที่ฉันทำร่วมกับ**เพื่อนฝูง**	**1**	**2**	**3**	**4**	**5**

ขอบคุณที่ให้ความร่วมมือ☺

ภญ.ฐิติพร นาคทวน, รศ.เรวดี ธรรมอุปกรณ์, รศ.ดร.ศุภกิจ วงศ์วิวัฒนนุกิจ ภาควิชาเภสัชกรรมปฏิบัติ คณะเภสัชศาสตร์ มหาวิทยาลัยฮาวาย มลรัฐฮาวาย สหรัฐอเมริกา 96720 โทรศัพท์ +1-808-933-2947,
E-mail: supakit@hawaii.edu

APPENDIX G

แบบวัดความรู้เกี่ยวกับบุหรี่

วันที่ประเมิน	ภาวะการสูบบุหรี่ ○ สูบ ○เลิกบุหรี่.....สัปดาห์/เดือน	
ชื่อผู้ประเมิน	HN	เลขที่

คำชี้แจง โปรดทำเครื่องหมาย ☑ ในช่องที่เลือก

	ใช่	ไม่ใช่	ไม่ทราบ
1. สารสำคัญในบุหรี่ที่ทำให้เสพติดคือ “คาเฟอีน”			
2 สารในควันบุหรี่ ทำให้เกิดอาการไอ มีเสมหะและหลอดลมอักเสบเรื้อรัง			
3. ในควันบุหรี่มีสารที่ทำให้เกิดโรคมะเร็งได้			
4. การสูบบุหรี่เพิ่มความเสี่ยงในการเกิดโรคมะเร็งปอดแต่ไม่เพิ่มความเสี่ยงต่อการเป็นโรคหัวใจ			
5. การสูบบุหรี่ช่วยลดการติดเชื้อในบริเวณทางเดินหายใจเนื่องจากควันบุหรี่ช่วยยับยั้งการเจริญเติบโตของเชื้อโรค			
6. การสูบบุหรี่ทำให้หน้าใส แก่ช้าลง			
7. การสูบบุหรี่ทำให้เล็บและนิ้วมือมีสีเหลืองน้ำตาลได้			
8. สตรีมีครรภ์ที่สูบบุหรี่ มีโอกาสเสี่ยงที่จะคลอดบุตรน้ำหนักตัวน้อยหรือคลอดก่อนกำหนด			
9. ผู้ที่ใช้ยาช่วยเลิกบุหรี่ จะทำให้เลิกบุหรี่ได้สำเร็จทุกคน			
10.เมื่อเลิกสูบบุหรี่ไปแล้ว หากนึกอยากสูบสามารถสูบได้ไม่เกินวันละ 2 มวน			
11.ผู้ที่เลิกสูบบุหรี่จะมีอายุยืนยาวกว่าผู้ที่ยังคงสูบบุหรี่อยู่ต่อไป			
12.เมื่อหยุดสูบบุหรี่อาจทำให้น้ำหนักตัวลดลง			
13.การให้กำลังใจตนเอง ว่าต้องเลิกบุหรี่ให้ได้ เป็นวิธีการสำคัญที่ช่วยให้เลิกบุหรี่ได้สำเร็จ			
14.การได้รับกำลังใจจากคนรอบข้าง เช่น คนในครอบครัว เพื่อนฝูง ไม่มีส่วนช่วยในการเลิกบุหรี่			
15.การปฏิเสธไม่รับบุหรี่จากผู้อื่น ถือว่าเป็นการเสียมารยาท			
16.ไม่ควรออกกำลังกายหลังจากเลิกบุหรี่ เพราะจะทำให้อ่อนเพลียง่าย			
17.การดื่มน้ำปริมาณมากๆ หลังจากเลิกบุหรี่แล้ว จะทำให้อยากสูบบุหรี่มากขึ้น			
18.การขายบุหรี่ในร้านสะดวกซื้อ สามารถตั้งโชว์ซองบุหรี่บนแผงได้			
19.รัฐบาลกำหนดให้หน้าซองบุหรี่ ต้องมีรูปภาพและคำเตือนเกี่ยวกับพิษภัยของบุหรี่			
20.ผู้ฝ่าฝืนสูบบุหรี่ในพื้นที่ห้ามสูบ เช่น รถโดยสารประจำทาง รถยนต์โดยสารรับจ้าง เรือโดยสาร เครื่องบินโดยสารภายในประเทศ มีโทษปรับไม่เกิน 2,000 บาท			
รวม			

APPENDIX H

Withdrawal and Craving scale

วันที่ประเมิน	ภาวะการสูบบุหรี่ ○ สูบ ○เลิกบุหรี่.....สัปดาห์/เดือน	
ชื่อผู้ประเมิน	HN	เลขที่

โดย ○ ล้อมรอบหมายเลขคำตอบตามความเป็นจริงที่ใกล้เคียงกับตัวท่านมากที่สุดเพียงข้อเดียว

ในช่วง 1 สัปดาห์ที่ผ่านมา	**ไม่เลย**	**น้อย**	**ปานกลาง**	**ค่อนข้างมาก**	**มาก**
1. มีความรู้สึกอยากสูบบุหรี่	**0**	**1**	**2**	**3**	**4**
2. รู้สึกซึมเศร้า	**0**	**1**	**2**	**3**	**4**
3. ฉุนเฉียว หงุดหงิด โกรธง่าย	**0**	**1**	**2**	**3**	**4**
4. วิตกกังวล เครียด	**0**	**1**	**2**	**3**	**4**
5. ไม่มีสมาธิในการทำงาน	**0**	**1**	**2**	**3**	**4**
6. กระวนกระวาย ไม่อยากพักอยู่กับที่	**0**	**1**	**2**	**3**	**4**
7. หิวบ่อย อยากอาหาร	**0**	**1**	**2**	**3**	**4**
8. นอนหลับยาก	**0**	**1**	**2**	**3**	**4**
9. นอนแล้วตื่นขึ้นมากลางดึก	**0**	**1**	**2**	**3**	**4**

	น้อย →						**มาก**
1. ฉันมีความต้องการที่จะสูบบุหรี่ในตอนนี้	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2. ไม่มีอะไรดีที่สุดเท่ากับการได้สูบบุหรี่ในตอนนี้	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3. ถ้าเป็นไปได้ ฉันอยากจะขอสูบบุหรี่ในตอนนี้	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4. ฉันจะสามารถควบคุมอารมณ์ได้ดีขึ้น หากได้สูบบุหรี่ในตอนนี้	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5. บุหรี่ คือสิ่งที่ฉันต้องการมากที่สุดในตอนนี้	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6. ฉันรู้สึกว่ามีแรงกระตุ้นที่ทำให้ฉันอยากสูบบุหรี่	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7. บุหรี่ที่สูบในช่วงนี้มีรสชาติดี	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8. ฉันสามารถทำอะไรก็ได้ เพียงขอให้มีบุหรี่สูบในตอนนี้	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9. การสูบบุหรี่จะช่วยให้ฉันหายซึมเศร้า	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10. ฉันจะสูบบุหรี่เร็วที่สุดเท่าที่จะเป็นไปได้	**1**	**2**	**3**	**4**	**5**	**6**	**7**

APPENDIX I

แบบแสดงเจตนายินยอมเข้าร่วมการวิจัย (Consent form)

วันที่ลงนาม.....

ข้าพเจ้า.....อายุ.....ปี อยู่บ้านเลขที่..... ถนน..... ..... ตำบล/แขวง.....อำเภอ/เขต.....จังหวัด.....

ก่อนที่จะลงนามในใบยินยอมให้ทำการวิจัยเรื่อง “การพัฒนาและประเมินผลโปรแกรมการเลิกบุหรี่โดยเภสัชกรสำหรับเยาวชนที่กระทำความผิด” ข้าพเจ้าได้รับการอธิบายจากผู้วิจัยถึงวัตถุประสงค์ของการวิจัย วิธีการวิจัย หรืออาการที่อาจเกิดขึ้นจากการวิจัย รวมทั้งประโยชน์ที่จะเกิดขึ้นจากการวิจัยอย่างละเอียด และมีความเข้าใจดีแล้ว ผู้วิจัยรับรองว่าจะตอบคำถามต่างๆ ที่ข้าพเจ้าสงสัยด้วยความเต็มใจไม่ปิดบังซ่อนเร้นจนข้าพเจ้าพอใจ

ผู้วิจัยรับรองว่าจะเก็บข้อมูลเฉพาะเกี่ยวกับตัวข้าพเจ้าเป็นความลับ และจะเปิดเผยได้เฉพาะในรูปที่เป็นสรุปผลการวิจัย การเปิดเผยข้อมูลเกี่ยวกับตัวข้าพเจ้าต่อหน่วยงานต่างๆที่เกี่ยวข้องกระทำได้เฉพาะกรณีจำเป็นด้วยเหตุผลทางวิชาการเท่านั้น

ข้าพเจ้าได้อ่านข้อความข้างต้นแล้ว และมีความเข้าใจดีทุกประการ และได้ลงนามในใบยินยอมนี้ด้วยความเต็มใจ

ลงชื่อ.....ผู้เข้าร่วมโครงการวิจัย
..... (ชื่อ-นามสกุล ตัวบรรจง)

ลงชื่อ.....ผู้ปกครอง
..... (ชื่อ-นามสกุล ตัวบรรจง)

ลงชื่อ.....ผู้ดำเนินการโครงการวิจัย
..... (ชื่อ-นามสกุล ตัวบรรจง)

ลงชื่อ.....พยาน
..... (ชื่อ-นามสกุล ตัวบรรจง)

ลงชื่อ.....พยาน
..... (ชื่อ-นามสกุล ตัวบรรจง)

APPENDIX J

แบบรายงานการเลิกบุหรี่ด้วยตนเอง (self-report)

วันกำหนดเลิกบุหรี่.....

ชื่อ-นามสกุล.....อายุ.....ปี อยู่บ้านเลขที่..... ถนน..... ตำบล/แขวง.....อำเภอ/เขต..... .....จังหวัด..... เบอร์โทรศัพท์ .....

บันทึกการเลิกบุหรี่

โปรดวงกลมรอบสัญลักษณ์และบันทึกจำนวนบุหรี่ที่สูบตามความเป็นจริง

	วันที่	ผลการเลิกบุหรี่	
		ไม่สูบ	สูบ
1		☺	☹ .....มวน/วัน
2		☺	☹ .....มวน/วัน
3		☺	☹ .....มวน/วัน
4		☺	☹ .....มวน/วัน
5		☺	☹ .....มวน/วัน
6		☺	☹ .....มวน/วัน
7		☺	☹ .....มวน/วัน
8		☺	☹ .....มวน/วัน
9		☺	☹ .....มวน/วัน
10		☺	☹ .....มวน/วัน
11		☺	☹ .....มวน/วัน
12		☺	☹ .....มวน/วัน
13		☺	☹ .....มวน/วัน
14		☺	☹ .....มวน/วัน

✷ *โปรดนำมาทุกครั้งที่มาเข้าร่วมโปรแกรมเลิกบุหรี่* ✷

	สัปดาห์ที่	ผลการเลิกบุหรี่							
		ไม่สูบ	สูบ						
3		☺							
4		☺							
5		☺							
6		☺							
7		☺							
8		☺							
9		☺							
10		☺							
11		☺							
12		☺							
13		☺							
14		☺							
15		☺							
16		☺							
17		☺							
18		☺							
19		☺							
20		☺							
21		☺							
22		☺							
23		☺							
24		☺							

✷ *โปรดนำมาทุกครั้งที่มาเข้าร่วมโปรแกรมเลิกบุหรี่* ✷

หากท่านมีข้อสงสัย ต้องการทราบข้อมูลเพิ่มเติมหรือต้องการคำแนะนำในการเลิกบุหรี่ สามารถติดต่อได้ที่ ภก.สุภกิจ ดำรงค์พิวัฒน์ โทร. 089-882-5758

APPENDIX K
แนวทางการดูแลช่วยเหลือระหว่างการเข้าร่วมโปรแกรมการเลิกบุหรี่

ครั้งที่ 1 สัปดาห์ที่ 0

- ชี้แจงโปรแกรม อธิบายถึงโครงการวิจัย วัตถุประสงค์ และประโยชน์ที่จะได้รับพร้อมทั้งขอความยินยอมและความร่วมมือจากเยาวชนและผู้ปกครองเพื่อเข้าร่วมโครงการ และขอตรวจวัดระดับโคตินินในปัสสาวะ
- บันทึกข้อมูลประวัติทั่วไป ประวัติการสูบบุหรี่ ประเมินระดับการติดสารนิโคตินโดยใช้แบบทดสอบ Fagerstrom ประเมินระดับความต้องการการเลิกบุหรี่จากแบบจำลอง Transtheoretical model และแบบทดสอบ “ทำไมคุณยังสูบบุหรี่อยู่”
- ทำแบบประเมินคุณภาพชีวิตด้านสุขภาพในคนไทยที่เลิกบุหรี่ และแบบวัดความรู้เกี่ยวกับบุหรี่
- แนะนำให้เห็นถึงประโยชน์ของการเลิกบุหรี่ ความรู้เกี่ยวกับพิษภัยจากการสูบบุหรี่ การปฏิบัติตนเพื่อให้เลิกบุหรี่ได้สำเร็จ การปรับเปลี่ยนพฤติกรรม
- วิธีการใช้ยาน้ำอมอดบุหรี่ หรือการใช้หมากฝรั่งนิโคติน อาการถอนยาที่อาจเกิดขึ้น ทำแบบประเมินอาการถอนนิโคติน (nicotine withdrawal & craving) เพื่อเป็นข้อมูลพื้นฐานของเยาวชน
- แนะนำเกี่ยวกับเรื่องการเสพติดสารนิโคติน และควันบุหรี่มือสอง
- แนะนำการฝึกฝนการแก้ไขปัญหาต่าง ๆ การควบคุมอารมณ์โกรธ และความเครียด โดยให้เยาวชนระบุกิจกรรมหรืองานอดิเรกที่ทำ และชมเชยหรือให้คำแนะนำเพิ่มเติม
- กำหนดวันเลิกบุหรี่ และกำหนดวันนัดครั้งต่อไป

ครั้งที่ 2 สัปดาห์ที่ 1 (ซักถามทางโทรศัพท์)

- ซักถามถึงความสำเร็จในการเลิกบุหรี่ อาการถอนยาที่เกิดขึ้น และให้คำแนะนำในการปฏิบัติตัว และให้กำลังใจ

ครั้งที่ 3 สัปดาห์ที่ 2

- ประเมินสภาพร่างกาย จิตใจ และปัญหาที่เกิดขึ้นในการเลิกบุหรี่ เพื่อร่วมกันแก้ปัญหา
- เสริมสร้างแรงจูงใจในการเลิกบุหรี่ให้กับเยาวชนและผู้ปกครอง ชมเชยและให้กำลังใจ
- ทำแบบประเมินคุณภาพชีวิตด้านสุขภาพในคนไทยที่เลิกบุหรี่ และแบบประเมินอาการถอนนิโคติน
- ส่งตรวจหาสารโคตินินในปัสสาวะ
- ทักษะต่าง ๆ ในการหลีกเลี่ยงสิ่งยั่วยุ เบี่ยงเบนความสนใจ ทักษะในการปฏิเสธบุหรี่จากผู้อื่น และให้กำลังใจโดยใช้เอกสารประกอบคำอธิบาย

ครั้งที่ 4 สัปดาห์ที่ 4

- ประเมินสภาพร่างกาย จิตใจ และปัญหาที่เกิดขึ้นในการเลิกบุหรี่ เพื่อร่วมกันแก้ปัญหา
- ให้เยาวชนระบุตัวกระตุ้น และบอกวิธีจัดการกับตัวกระตุ้นที่อาจทำให้เยาวชนหวนกลับไปสูบบุหรี่ได้ เพื่อแนะนำแนวทางหรือวิธีการที่เหมาะสม

- ให้กำลังใจในการเลิกบุหรี่ และให้เยาวชนเสนอแนวทางการป้องกันตนเอง เพื่อป้องกันการกลับไปสูบบุหรี่ซ้ำ
- ทำแบบประเมินคุณภาพชีวิตด้านสุขภาพในคนไทยที่เลิกบุหรี่ แบบวัดความรู้เกี่ยวกับบุหรี่ และแบบประเมินอาการถอนนิโคติน
- ส่งตรวจหาสารโคตินินในปัสสาวะ

ครั้งที่ 5 สัปดาห์ที่ 8

- ประเมินสภาพร่างกาย จิตใจ และปัญหาที่เกิดขึ้นในการเลิกบุหรี่ เพื่อร่วมกันแก้ปัญหา
- ระบุตัวกระตุ้นที่ยังทำให้สูบบุหรี่ เพื่อหาวิธีดำเนินการแก้ไข และให้คำแนะนำต่อไป
- ทำแบบประเมินคุณภาพชีวิตด้านสุขภาพในคนไทยที่เลิกบุหรี่ และแบบประเมินอาการถอนนิโคติน

ครั้งที่ 6 สัปดาห์ที่ 12

- ประเมินสภาพร่างกาย จิตใจ และปัญหาที่เกิดขึ้นในการเลิกบุหรี่ เพื่อร่วมกันแก้ปัญหา
- ระบุตัวกระตุ้นที่ยังทำให้สูบบุหรี่ เพื่อหาวิธีดำเนินการแก้ไข และให้คำแนะนำต่อไป
- ทำแบบประเมินคุณภาพชีวิตด้านสุขภาพในคนไทยที่เลิกบุหรี่ แบบวัดความรู้เกี่ยวกับบุหรี่ และแบบประเมินอาการถอนนิโคติน
- ส่งตรวจหาสารโคตินินในปัสสาวะ
- เสริมความรู้ในส่วนที่ยังขาด (หลังจากทำแบบวัดความรู้เกี่ยวกับบุหรี่)

ครั้งที่ 7 สัปดาห์ที่ 16

- ประเมินสภาพร่างกาย จิตใจ และปัญหาที่เกิดขึ้นในการเลิกบุหรี่ เพื่อร่วมกันแก้ปัญหา
- ให้เยาวชนระบุถึงข้อดีและประโยชน์ที่ได้รับจากการเลิกบุหรี่ เปรียบเทียบสุขภาพของตนเองเมื่อเทียบกับอดีตที่เคยสูบบุหรี่
- ทำแบบประเมินคุณภาพชีวิตด้านสุขภาพในคนไทยที่เลิกบุหรี่ และแบบประเมินอาการถอนนิโคติน

ครั้งที่ 8 สัปดาห์ที่ 20 (ซักถามทางโทรศัพท์)

- สอบถามพฤติกรรมการสูบบุหรี่ และปัญหาเกี่ยวกับบุหรี่ที่เกิดขึ้น และให้กำลังใจ

ครั้งที่ 9 สัปดาห์ที่ 24

- ประเมินสภาพร่างกาย จิตใจ และปัญหาที่เกิดขึ้นในการเลิกบุหรี่ เพื่อร่วมกันแก้ปัญหา
- เน้นย้ำกับเยาวชนว่าไม่ควรกลับไปสูบบุหรี่อีก และควรใช้ประสบการณ์ในการเลิกบุหรี่ของตนเองเป็นแนวทางในการให้คำแนะนำเพื่อนหรือบุคคลอื่นในครอบครัวที่สูบบุหรี่
- ทำแบบประเมินคุณภาพชีวิตด้านสุขภาพในคนไทยที่เลิกบุหรี่ แบบวัดความรู้เกี่ยวกับบุหรี่ และแบบประเมินอาการถอนนิโคติน
- ส่งตรวจหาสารโคตินินในปัสสาวะ

APPENDIX L
รายนามผู้เชี่ยวชาญที่ตรวจสอบความตรงตามเนื้อหา

รองศาสตราจารย์ เภสัชกร ดร.ศุภกิจ วงศ์วิวัฒนนุกิจ
ภาควิชาเภสัชกรรมปฏิบัติ
คณะเภสัชศาสตร์ มหาวิทยาลัยฮาวาย สหรัฐอเมริกา

รองศาสตราจารย์ เภสัชกรหญิงเรวดี ธรรมอุปกรณ์
ภาควิชาเภสัชกรรมปฏิบัติ
คณะเภสัชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

เภสัชกรหญิงสมพร สุวรรณมาโจ
กลุ่มงานเภสัชกรรม
สถาบันธัญญารักษ์

อาจารย์ เภสัชกรชาญกิจ พุฒิเลอพงษ์
ภาควิชาเภสัชกรรมปฏิบัติ
คณะเภสัชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

Vitae

Mr. Supakit Dumrongpiwat was born on August 7, 1980 in Bangkok. He graduated with a Bachelor's Degree in Pharmacy (First Class Honours) in 2003 from the Faculty of Pharmaceutical Sciences, Chulalongkorn University. His current position is a pharmacist in Department of Pharmacy, Srithanya Hospital, Nonthaburi, Thailand.