

Factors relating to Success to Quit Smoking among Citizens Receiving Smoking-Cessation Clinics Services in a Public Health Center

Young-Shil Lim¹, Moo-Sik Lee^{2*}, Jee-Young Hong², Hyun-Soo Kim², Eun-Young Kim²

¹Division of Emergency Healthcare and Preparedness, Office of Health Policy, Ministry of Health and Welfare,

²Department of Preventive Medicine and Public Health, College of Medicine, Konyang University

보건소 금연클리닉 이용자의 금연성공 관련요인

임영실¹, 이무식^{2*}, 홍지영², 김현수², 김은영²

¹보건복지부 보건의료정책실 응급의료과, ²건양대학교 의과대학 예방의학교실

Abstract The aim of this study was to find the factors related to smoking-cessation among citizens receiving smoking-cessation clinics' services in a public health center in Daejeon metropolitan city. The study subjects were 2,125 participants registered in "smoking-cessation clinic", public health centers in 2007. Frequency analysis, chi-squared test and multiple logistic regression analysis were used to determine the relationships between the success rate of smoking-cessation and the characteristics. The success rate of smoking-cessation during 6 months was 39.8%. Males had a higher rate than females, and people over 65 years of age had a higher rate than those less than 40 years of age. High blood pressure, drinking of more 2 times per week, regular exercise, CO under 10ppm had significantly relationships with the smoking-cessation rate. The other independent variables had no statistically significance with the smoking-cessation success rate. Logistic regression analysis showed that age, number of nicotine patches used and total consultation times had significantly relationships with the smoking-cessation success rate. The total consultation times showed the highest odds ratio than the other significant factors. This study suggests that regular consultations will be the most effective intervention towards maintaining smoking cessation programs of smoking-cessation clinics in public health centers.

요약 이 연구는 일개광역시 보건소 금연클리닉 서비스 이용자의 금연관련 요인을 찾고자 수행되었다. 연구 대상자는 2007년 일개광역시 보건소 금연클리닉에 등록된 이용자 2,125명이었다. 빈도분석, 카이제곱검정, 다중로지스틱 회귀분석 등이 이용되었다. 6개월 금연 성공률은 39.8%였다. 남성, 65세 이상에서 금연률이 높았다. 고혈압, 주 2회 이상 음주자, 규칙적인 운동자, 10ppm 이상의 일산화탄소량 일수록 금연성공률이 유의하게 높았다. 다른 독립변수는 금연성공률과 통계학적으로 유의한 결과를 보이지 않았다. 로지스틱회귀분석 결과, 연령, 사용된 니코틴패치 수, 총 의뢰횟수 등이 금연성공과 유의한 기여요인으로 도출되었다. 특히 총 의뢰횟수가 가장 높은 오즈비를 보였다. 규칙적인 의뢰가 보건소 금연클리닉 프로그램에서 금연성공의 가장 효과적인 중재가 될 수 있음을 확인하였다.

Key Words : smoking-cessation, smoking-cessation clinic, public health center, citizen

1. Introduction

Smoking is the major cause of various disease[1].
Quitting smoking has benefits to reduce risks for

disease[1].

Korea government is providing smoking cessation clinic program to increase smoking cessation rate and to decrease smoking rate in 253 public health

*Corresponding Author : Moo-Sik Lee(Konyang Univ.)

Tel: +82-10-2514-4527 email: mslee@konyang.ac.kr

Received July 7, 2014

Revised August 6, 2014

Accepted August 7, 2014

centers[2]. In 2012, Korea achieved 65.3% smoking cessation rate of 6 month after starting cessation[2]. According to 2012 Korea National Health and Nutrition Survey, smoking rate of Korea was reported to be 43.7%, 7.9% and 25.8% for men, women and both men and women[3]. That is higher level than OECD countries[4]. A study reported Factors relating to Success to Quit Smoking is different in locality[5]. So it is important that region specialized smoking-cessation clinic program management to effectively increase smoking cessation rate of each region as limited resources. This study aimed to investigate the related factors that affect success and failure of smoking-cessation and effective modalities in smoking cessation clinic of public health center in Daejeon metropolitan city, Korea.

2. Methods and materials

The study subjects were 2,125 citizens who had attended the smoking cessation clinic of a public health center for 6 months in an attempt to quit smoking between January and December 2007. Data were collected with a structured questionnaire and stored in database of health center, by phone interview, regarding individual smoking habits, if any, over the 6 month study period. The factors which may have caused an individual to smoke again were examined. The patients were followed up after registration and periodic check to identify factors relating to success and failure to quit smoking. The quit proportion was defined as the proportion of people achieving six months prolonged abstinence with a denominator of all those who attended the service and set a quit date.

The study variables included general characteristics (name of health center, age, gender, occupation, BMI, drinking behavior, exercise behavior, blood pressure etc), smoking behaviors (age of beginning smoking, amount of smoking per day, total duration of smoking, CO level, dependency of nicotine by Fagerstrom test),

smoking cessation behavior (motivation of registration, previous trial method, causes of previous failure, duration of smoking cessation) and interventional and result variables (history of drug or patch contra-indication, side effect of nicotine patch, frequency of counselling, number of used patches).

For analysis, respondents were classified into two groups according to success and failure on quitting smoking after registration of smoking cessation clinic. The difference in success and failure on quitting smoking according to the socio-demographic characteristics of study subjects were analyzed by frequency analysis and χ^2 test. Finally, logistic regression analysis was used to investigate related factors with success on quitting smoking by inputting the variables significantly deduced in the univariate analysis. All statistical analyses were done with SPSS win software, version 12.0.

3. Results

3.1 Comparison of general characteristics between success and failure group of quitting smoking

Among all enrollees of smoking cessation clinic within the data collection period, about 40% of them had successful quit attempts. Table 1 shows the success rate of quit attempts based on enrolment to the clinic between January and December 2007. The results of the descriptive analysis are presented in [Table 1-3].

In this study, we defined that success rate of quitting smoking was quitting status at 6 month cessation. Success rate was 39.8% in total study subjects. 41.5% in men and 24.1% in women had successful quit attempts significantly ($p < 0.01$). The mean age of the study participants was 43.1 years and 1,913(90%) were men. Compared to age groups, being below 40th had 28.9%, being above 65 years had 57.5% to quit smoking successfully ($p < 0.01$). Having a hypertension 44.0% ($p < 0.01$), alcohol drinker

44.1%(p<0.05), regular exerciser 54.0%(p<0.01), type of registered health center(p<0.01), were also significantly success variables for smoking cessation[Table 1].

[Table 1] General characteristics of study subjects
Unit: N(%)

Variables	Total	Successor	Failure	p-value*
Gender				0.00
Male	1,913(90.0)	793(41.5)	1,120(58.5)	
Female	212(10.0)	51(24.1)	161(75.9)	
Age(years)				0.00
< 39	850(40.0)	246(28.9)	604(71.1)	
40 - 64	1,062(50.0)	475(44.7)	587(55.3)	
≥ 65	213(10.0)	123(57.5)	90(42.3)	
Occupation				0.17
Have	1,627(76.6)	633(38.9)	994(61.1)	
Have'nt	498(23.4)	221(42.4)	287(57.6)	
Social security				0.06
Health insurance	2,027(95.4)	796(39.3)	1,231(60.7)	
Medical aid	98(4.6)	48(49.0)	50(51.0)	
Health center				0.00
A	481(22.6)	202(42.0)	279(58.0)	
B	339(16.0)	103(30.4)	236(69.6)	
C	473(22.3)	205(43.3)	268(56.7)	
D	413(19.5)	114(27.6)	299(72.4)	
E	419(19.7)	220(52.5)	199(47.5)	
BMI				0.19
≤ 24	1,504(70.8)	584(38.8)	920(61.2)	
≥ 25	621(29.2)	260(41.9)	361(58.1)	
Blood pressure				0.00
Normal	1,405(66.1)	52(37.5)	878(62.5)	
Hypertension	720(33.9)	317(44.0)	403(56.0)	
Alcohol				0.01
≤ 1/week	1,442(67.9)	543(37.7)	899(62.3)	
≥ 2/week	683(32.1)	301(44.1)	382(55.9)	
Exercise				0.00
Regular	513(24.1)	277(54.0)	236(46.0)	
None	1,612(75.9)	567(35.2)	1,045(64.8)	
Total	2,125(100.0)	846(39.8)	1,279(60.2)	

* by χ^2 -test

3.2 Comparison of smoking behavioral characteristics between success and failure group of quitting smoking

Of total subjects, 40.5% started smoking in their teen age period, 59.5% started in 20th years. However, there were no significant relationship between starting age for smoking and success for quitting smoking. About 42.4% of the participant that below 10 ppm of carbon monoxide level in ventilated air had successful quit attempts significantly higher than the participant

that above 10 ppm level(p<0.01). Recommendation from neighbors (62.9%), guide letter of health center like a poster (30.4%), mass media (6.7%) were identified as motives for smoking cessation. 49.6% of being mass media as motive for smoking cessation had successful quit attempts significantly(p<0.01). However, we did'nt investigate a significant difference success of smoking cessation according to amount of smoking per day, total duration of smoking, nicotine dependency, previous trial methods, causes of failure, and previous duration of smoking cessation[Table 2].

[Table 2] Comparison of smoking and cessation characteristics between successor and failure of smoking cessation
Unit: N(%)

Variables	Total	Successor	Failure	p-value*
Starting age of smoking(years)				0.37
≤ 19	861(40.5)	332(38.6)	529(61.4)	
≥ 20	1,264(59.5)	512(40.5)	752(59.5)	
Amount of smoking(packs/day)				0.86
< 1 pack	831(39.1)	336(40.4)	495(59.6)	
1 pack	765(36.0)	300(39.2)	465(60.8)	
> 1 pack	529(24.9)	208(39.3)	321(60.7)	
Duration of smoking(years)				0.15
≤ 19	820(38.6)	310(37.8)	510(62.2)	
≥ 2-	1,305(61.4)	534(40.9)	771(59.1)	
CO level				0.04
≤ 9 ppm	863(40.6)	366(42.4)	497(57.6)	
≥ 10 ppm	1,262(59.4)	478(37.9)	784(62.1)	
Dependency on nicotine				0.18
Low	762(35.8)	321(42.1)	441(57.9)	
Moderate	820(38.6)	308(37.6)	512(62.4)	
High	543(25.6)	215(39.6)	328(60.4)	
Cue to action				0.00
Mass media	143(6.7)	71(49.6)	72(50.4)	
Guide letter	646(30.4)	198(30.7)	448(69.3)	
Recommend by neighbour	1,336(62.9)	575(43.0)	761(57.0)	
Method of previous cessation				0.92
Self willingness	629(29.6)	256(40.7)	373(59.3)	
Program	158(7.4)	66(41.8)	92(58.2)	
None of trial	1,338(63.0)	524(39.1)	814(60.9)	
Cause of previous failure				0.92
Inadequate of willingness	274(12.9)	113(41.3)	161(58.8)	
Stress	264(12.4)	107(40.5)	157(59.5)	
Etc	215(10.1)	86(40.0)	129(60.0)	
None of trial	1,372(63.0)	538(39.2)	834(60.8)	
Duration of previous cessation(months)				0.65
< 6 months	708(33.3)	290(38.1)	418(54.9)	
≥ 6 months	53(2.5)	24(3.2)	29(3.8)	
None of trial	1,364(64.2)	533(39.0)	831(61.0)	
Total	2,125(100.0)	846(39.8)	1,287(60.2)	

* by χ^2 -test

3.3 Comparison of interventional components between success and failure group of smoking cessation

51.5% of the participant that used above 8 papers of total amount of used patch had successful quit attempts significantly higher than the participant that below 7 papers($p < 0.01$). 88.0% of having above 9 counselling had success quitting smoking significantly higher than below 3 counselling(0.3%) and 4-8 counselling(25.4%) ($p < 0.01$). However, there was no significant relationship between success of smoking cessation and side-effect of nicotine patch, history of contra-indication on the patch and drug[Table 3].

[Table 3] Comparison of interventional factor between successor and failure of smoking cessation

Unit: N(%)

Variables	Total	Successor	Failure	p-value*
History of drug or patch contra-indication				0.98
No	2,065(97.2)	818(38.5)	1,247(58.7)	
Yes	60(2.8)	28(46.7)	32(53.3)	
Amount of used patch(number)				0.00
≤ 7	1,706(80.2)	629(36.9)	1,077(63.1)	
≥ 8	419(19.8)	217(51.5)	202(48.5)	
Side effect of nicotine				0.07
No	1,650(77.7)	638(38.7)	1,012(61.3)	
Yes	475(22.3)	206(43.4)	267(56.6)	
Frequency of total counselling(times)				0.00
≤ 3	781(36.7)	2(0.3)	777(99.7)	
4 - 8	544(25.6)	138(25.4)	406(74.6)	
≥ 9	790(37.2)	695(88.0)	95(12.0)	
Total	125(100.0)	846(39.8)	1,279(60.2)	

* by χ^2 -test

3.4 Logistic regression for success smoking cessation

In multiple logistic regression analysis for success smoking cessation, significant factors included age, type of health center, number of used nicotine patch, number of counselling($p < 0.05$). The factors related to

smoking cessation within 6 month after registration from smoking cessation clinic were age(OR: 1.45, 95% CI: 1.04-2.03 in 40-64)(OR: 2.07, 95% CI: 1.21-3.54 in 65), health center(OR: 5.96, 95% CI:3.42-10.37 in B health center)(OR: 5.86, 95% CI: 3.46-9.91 in D health center)(OR: 2.89, 95% CI: 1.74-4.80 in E health center), number of used patch(OR: 1.66, 95% CI: 1.46-1.93), and number of counselling(OR: 144.5, 95% CI: 35.30-591.08 in 4-8 times)(OR: 5650.61, 95% CI: 1337.57-23871.20 in ≥9 times)[Table 4].

[Table 4] Odds ratio of independent variables for success smoking cessation by multiple logistic regression analysis

Variables	OR	95% CI of OR	p-value
Gender			
Male	1.00		
Female	0.79	0.44-1.41	0.43
Age(years)			
≤ 39	1.00		
40 - 64	1.45	1.04-2.03	0.03
≥ 65	2.07	1.21-3.54	0.01
Health center			
A	1.00		
B	5.96	3.42-10.37	0.00
C	1.10	0.63-1.91	0.74
D	5.86	3.46-9.91	0.00
E	2.89	1.74-4.80	0.00
Motivation			
Mass media	1.00		
Guide letter	0.66	0.35-1.26	0.21
Recommendation	0.73	0.41-1.32	0.30
Hypertension			
Normal	1.00		
Hypertension	1.28	0.93-1.75	0.14
Alcohol			
≤ 1 / week	1.00		
≥ 2 / week	1.09	0.78-1.51	0.62
Exercise			
Regular	1.00		
None	0.77	0.54-1.10	0.15
CO			
≤ 9 ppm	1.00		
≥ 10 ppm	1.02	0.74-1.41	0.92
Number of used patch			
≤ 7	1.00		
≥ 8	1.66	1.46-1.93	0.02
Number of total counselling(times)			
≤ 3	1.00		
4 - 8	144.5	35.30-591.08	0.00
≥ 9	5650.6	1337.57-23871.20	0.00

4. Discussion

Smoking remains a major cause of illness and death in spite of implementing various antismoking measures by government and agencies all over the world[6] include Korea also. According to 2012 Korea National Health and Nutrition Survey, the smoking rate of Koreans was reported to be 43.7%, 7.9%, and 25.8% for men, women, and both men and women, respectively, which is relatively high[3,4].

The antismoking health projects have been intensified in Korea since 1990 via both community and clinic approaches. Smoking cessation clinics of public health center in Korea offer free counselling and provide free medication including Nicotine Replacement Therapy[2]. However, not all smokers who enrolled in the quit smoking clinics managed to quit successfully. There are many kind of that causes which associated with smoking cessation[7–10]. The objectives of this study was to investigate the success rate of quit attempts and identify factors associated with success or failure of quit attempts in a smoking cessation clinic of public health center in Daejeon metropolitan city, Korea.

Success rate of smoking cessation achieve 6 months of abstinence was 39.8% in this study. That result was higher rate than 25% US citizens[11]. It was well-known that smoking cessation clinics are essential in assisting their clients to quit smoking. But, There are marked variations in smoking cessation rate in the world.

In this study, the factors leading to quit smoking successfully were "age", "type of health center", "number of used nicotine patch" and, "number of counselling". Over increasing age of participant, success rate of smoking cessation was increasing trend. In univariate analysis, older age was significantly related with nicotine dependency, total number of counselling, higher performer of exercise. Age may impact to life-style change. This results was similar trend with other study[12]. Success rate of

smoking cessation were varied by public health center that operated smoking cessation clinic. Some health center had more registered smokers than other health centers, and had different alcohol drinking rate, employment rate, and socioeconomic status in the results of univariate analysis. So, we can't rule out that may impact to success rate of smoking cessation. Number of delivered nicotine patch was significant variable that impact to success of smoking cessation in this study. However, there was different result with other study[13]. We can guess that participants who were dependent to nicotine would be more likely to failure. However, in this study, there was no association between level of addiction and success of quit attempts. Nevertheless, we find significant relationship between the number of delivered nicotine patch and success of smoking cessation in multivariate analysis. Number of counselling was also significant variable that impact to success of smoking cessation which was same results with other studies[7,14]. Slovynec D'Angelo et al[15] also reported that lower rates of compliance with treatment are directly associated with lower rates of abstinence from smoking. One study suggested that the relationship between adherence and success indicates the importance of studies that contribute towards optimizing the adherence strategies[16].

Some limitations of this study should be highlighted. The limitation to our study was that the participants were in contact with the public health smoking cessation clinic in limited area of Korea. This also was not randomized trial, but retrospective observatory study. This information is still not available in all of quit smoking clinics. We would like to recommend exploring this area for further research.

5. Conclusions

In conclusion, the intervention should be feasible and acceptable program. Our results indicate that method of

intervention(more deliver nicotine patch and increased counselling), targeting to more older age, some characteristics of public health center are important considerations in a public health center program geared towards maintaining smoking cessation. These future trials of outreach interventions need to be of sufficient counselling and deliver adequate nicotine patch to allow embedding of new models of smoking cessation service delivery.

Reference

- [1] U. S. Department of Health and Human Services(USDHHS). The Health Consequences of Smoking: A Report of the Surgeon General. Atlanta, GA: U. S. Department of health and Human services, Centers for Disease Control and Prevention, Office on Smoking and Health, 2004
- [2] Ministry of Health and welfare. 2012 White book of Health and Welfare. Seoul: Ministry of Health and Welfare.;2013, p.691-697.(Korean)
- [3] Ministry of Health and Welfare, Korea Centers for Disease Control and Prevention. The Fifth Korea National Health and Nutrition Examination Survey(KNHANES V), 2012. Seoul: Ministry of Health and Welfare, Korea Centers for Disease Control and Prevention.;2013.[cited 2013 Dec] Available from: <http://knhanes.cdc.go.kr>
- [4] Organization for Economic Cooperation and Development(OECD). OECD Health Statistics 2014[cited 2014 Aug 1]. Available from: <http://www.oecd.org/health/healthdata>
- [5] Lee JY, Song TM. The Factors Influencing on Success of Quitting Smoking in Rural and Urban Smoking Cessation Clinics. *J Agri Med & Community Health* 2008;33(3):292-302
DOI: <http://dx.doi.org/10.5393/JAMCH.2008.33.3.292>
- [6] WHO. An International Treaty for Tobacco Control. Geneva, World Health Organization. 2003.
- [7] Kim YH. Factors affecting the Success of Smoking Cessation for Six Months in the Smoking Cessation Clinic of a Public Health Center Based on the Transtheoretical Model. *J Korean Acad Community Health Nurs* 2009;20(4): 433-442
DOI: <http://dx.doi.org/10.4040/jkan.2009.39.3.433>
- [8] Hyland A, Borland R, Li Q, Yong H-H, McNeil A, Fong GT, O'connor RJ, Cummings KM. Individual-level predictors of cessation behaviours among participants in the International Tobacco Control Four Country Survey. *Tob Control*, 2006; 15(suppl 3): 83-94.
DOI: <http://dx.doi.org/10.1136/tc.2005.013516>
- [9] Zhou X, Nonnemaker J, Sherrill B, Gilensan AW, Coste F, West R. Attempts to quit smoking and relapse: factors associated with success or failure from the ATTEMPT cohort study. *Addict Behav* 2009; 34(4): 365-373.
DOI: <http://dx.doi.org/10.1016/j.addbeh.2008.11.013>
- [10] Su TTI, Sallehuddin BA, Murniati HH, Swinder J, Al Sadat N, Saimy I. Factors associated with success or failure of quit attempts: a clinical approach for lung cancer prevention. *Asian Pac J Cancer Prev*. 2012;13(1):175-9.
DOI: <http://dx.doi.org/10.7314/APJCP.2012.13.1.175>
- [11] USDHHS. The Health benefits of smoking cessation : a report of the Surgeon General, Rockville, Md: US Department of Health and Human Services, 1990.
- [12] Cho KS, Song TM. Analysis of key factors in smoking cessation and cost effectiveness at public health center. *Health-welfare Policy Forum* 2006; 121(11): 65-77.
- [13] Yoo SH. The factors associated with short term success of smoking-cessation at public health centers smoking-cessation clinic, Thesis of Master of Public Health, Yonsei University, 2006
- [14] Kim EY. The factors impact to smoking cessation. Thesis of Master of Public Health, Seoul National University, 2006.
- [15] D'Angelo MES, Reid RD, Hotz S, Irvine J, Segal CRJ, Blanchard CM, Pipe A. Is stress management training a useful addition to physician advice and nicotine replacement therapy during smoking cessation in women? Results of a randomized trial. *Am J Health Promot* 2005; 20(2): 127-134.
DOI: <http://dx.doi.org/10.4278/0890-1171-20.2.127>
- [16] De Azevedo RCS, Fernandes RF. Factors relating to failure to quit smoking: a prospective cohort study. *Sao Paulo Med J* 2011; 129(6): 380-386.
DOI: <http://dx.doi.org/10.1590/S1516-31802011000600003>

Young Shil Lim

[Regular member]



- 2006. 3~2010. 2: Resident of Family medicine, Konyang university hospital
- 2010. 3~2014. 3: Senior researcher in Korea centers for disease control & prevention
- 2014. 3~: Deputy healthcare director, Division of emergency healthcare, Ministry of health and Welfare
- 2011. 3~: Doctoral course, Department of Preventive medicine, Konyang University

<Research Interests>

Health care management, Clinical preventive medicine, Family medicine, Hospital management

Moo-Sik Lee

[Regular member]



- 1999. 3~: Professor, Department of Preventive Medicine, College of Medicine, Konyang University
- 2008. 10~2011. 7: Chief of Clinical Trial Center of Konyang University Hospital
- 2011. 8~ 2012. 7: Visiting professor of Mayo Clinic in USA
- 2013. 4~: Dean of The Graduate School of Public Health and Welfare, Konyang University

<Research Interests>

Health care management, Clinical preventive medicine, Occupational safety and health, Hospital management

Jee Young Hong

[Regular member]



- 2003. 3~2005. 2 : Master of Public health, The Graduate School of Public Health and Welfare, Konyang University
- 2005. 9~2011. 2 : Doctor course completion, Seoul National University
- 2006. 4~2009. 4 : Captain of army doctor, Department of health & welfare, Ministry of National defense
- 2009. 5~ : Assistant professor of Konyang University

<Research Interests>

Preventive medicine, Health care, Military medicine, Geriatric medicine, Community health

Hyun-Soo Kim

[Regular member]



- 2009. 2 : Graduate of Konyang Medical University
- 2012. 3~ 2013. 2 : Intern of National Medical Center
- 2013. 3~ 현재 : Resident of Preventive Medicine, Konyang University

<Research Interests>

Health care management, Clinical preventive medicine, Hospital management

Eun-Young kim

[Regular member]



- 2006. 2 : Master of Public health, The Graduate School of Public Health and Welfare, Konyang University
- 2008. 12~2009. 9 : Support group of Health promotion project of Daejeon city
- 2013. 4~ : Senior research assistant, Department of Preventive medicine, Konyang University

<Research Interests>

Health care management, Hospital management, Epidemiology