Effects of Different Types of Smoking Cessation Treatments for South Korean Adult Smokers without an Intention to Quit

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Background: While there are many different ways to quit smoking, current methods are not equally successful. The objective of this study was to analyze the effects of different types of stop smoking treatment for South Korean adult smokers without an intention to quit.

Methods: This cross-sectional study used data of 14,174 adults (age 19 years and over) from the Korea national health and nutrition examination survey (2007-2012) who have experience of smoking. The data were analyzed using multiple logistic regression.

Results: According to multiple logistic regression analysis, the education and counseling plus prescription drug group (OR = 14.831, 95% CI = 1.256 to 175.136) and education and counseling plus NRT group (OR = 3.060, 95% CI = 1.971 to 4.748) were associated with increased odds of quitting success compared to the no intervention group. Second, the education and counseling group was associated with increased odds of quitting success compared to the no intervention group (OR = 4.944, 95% CI = 3.463 to 7.058). Third, education and counseling plus NRT (OR = 0.325, 95% CI = 0.161 to 0.657) and NRT alone (OR = 0.322, 95% CI = 0.175 to 0.593) were associated with decreased odds of quitting success compared to the group using prescription drug only.

Conclusion: These findings suggest that an approach utilizing education and counseling plus prescription drugs is the most successful type of stop smoking treatment for South Korean adult smokers without an intention to quit.

Key Words: Smoking cessation, Quitting intention, Nicotine replacement therapy, Education and counseling, South Korea

INTRODUCTION

Cigarette smoking is a major preventable cause of death worldwide [1], resulting in over five million deaths a year from 1990 to 2015 [2]. Although the smoking rate among South Korean adults over the age of 19 has consistently decreased from 1998 to 2013, 24.1% of all adults in South Korea were still current smokers in 2013 (Fig. 1). In addition, 79.9% of South Korean adult smokers have no plan to quit smoking within one month according to data from the Korea National Health and Nutrition Examination Survey (2013) [3]. Thus, it is necessary to develop effective smoking cessation strategies for adult smokers without an intention to quit.

While there are various ways to quit smoking including behavioral support (education and counseling, telephone

counseling) and medications (prescription drugs, NRT), they are not equally effective. Numerous research studies have shown that behavioral support plus medication significantly increased smoking abstinence in comparison with no intervention [4-6]. However, research on the efficacy of behavioral support without medications has yielded inconclusive results. Specifically, some research studies demonstrated that behavioral support without medication, such as counseling from a healthcare professional, can increase the odds of

quitting success [7-10]. Stead et al. [11] claimed that telephone counseling without medications can also increase the odds of quitting success. In contrast, Glasgow et al. [12] asserted that behavioral support without medications did not significantly increase smoking abstinence in comparison to no intervention. Regarding behavioral support, telephone counseling is effective compared to no counseling or self-help according to the results of three meta-analyses [11,13,14]. In the case of medications, even though NRT is commonly used as a smoking cessation therapy, the resulting short-term (four-week) quit rate (44%) was lower than that found with prescription drugs (59%) such as varenicline and bupropion [15]. Thus, the objective of this study was to identify the effects of different types of stop smoking treatment for South Korean adult smokers without an intention to quit. The following associated hypotheses were examined in this study:

(1) Behavioral support plus medication is associated with increased odds of quitting success compared to no intervention

(2) Behavioral support without medication is not associated with increased odds of quitting success com-

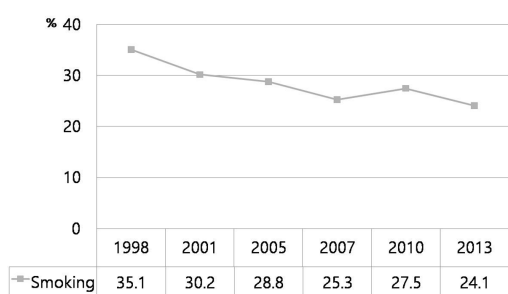| %	1998	2001	2005	2007	2010	2013
Smoking	35.1	30.2	28.8	25.3	27.5	24.1

Fig. 1. Smoking trend for South Korean adults (over 19 years of age). Source: Ministry of Health and Welfare, 2014, Korea Health Statistics 2013.

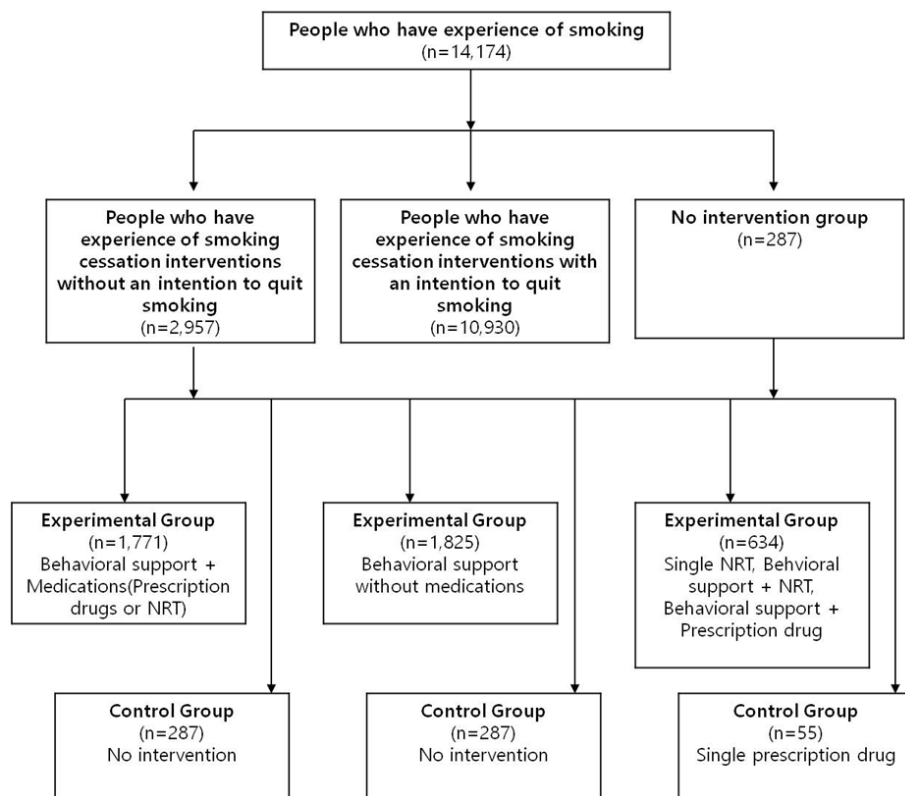
Fig. 2. Sample flow diagram: Korea National Health and Nutrition Examination Survey (2007-2012).

pared to no intervention

(3) Behavioral support plus NRT or NRT alone is associated with decreased odds of quitting success compared to use of prescription drugs alone

MATERIALS AND METHODS

1. Study design and participants

This cross-sectional study used data from the 2007–2012 Korea National Health and Nutrition Examination Survey (KNHANES) of 14,174 adults age 19 years and over who had smoking experience. The KNHANES is an ongoing surveillance system in Korea that has assessed the health and nutritional status of Koreans since 1998, and is performed by the Korea Centers for Disease Control and Prevention. Since 1998, the KNHANES has had the aim of monitoring trends in health risk factors and the prevalence of major chronic diseases and has provided data for the development and assessment of health policies and programs in Korea. This nationally representative, cross-sectional survey collects data on socio-demographic characteristics, health behaviors, quality of life, healthcare utilization, anthropometric measures, biochemical and clinical profiles for chronic diseases, and dietary intake of approximately 10,000 Koreans every year [16]. This study did not require approval from an institutional review board because the KNHANES data are secondary data that do not include personal information. However, the secondary data used in this study contained responses to detailed questions relating to socio-demographic variables and smoking-linked variables including smoking status, types of smoking cessation therapy, and stress exposure (Fig. 2).

2. Measures

1) Current smoking status

The current smoking status variable was converted to a binary index variable (yes, no) based on responses to the following item: "Do you smoke now?"

2) Stop smoking treatments

Seven categorical variables associated with stop smoking treatments were extracted from the dataset. Each variable was converted to a binary index variable (yes, no) based on responses to the following item: "These are some ways to

help you quit smoking. Please indicate all methods of smoking cessation you have used to quit." Then, grouping varia-

Table 1. Frequencies and weighted percentages of South Korean adults who have experience of smoking, Korea National Health and Nutrition Examination Survey

Characteristic		2007-2012 (N = 14,174)
		N (%)
General characteristics of participants		
Gender	Male	11,887 (83.9)
	Female	2,287 (16.1)
Age (years)	Over 65	3,273 (23.1)
	60-64	1,187 (8.4)
	50-59	2,446 (17.3)
	40-49	2,699 (19.0)
	30-39	2,900 (20.5)
	19-29	1,669 (11.8)
Income level	1st quartile (highest)	3,726 (26.3)
	2nd quartile	3,899 (27.5)
	3rd quartile	3,684 (26.0)
	4th quartile (lowest)	2,865 (20.2)
Education level	University or more	4,205 (29.7)
	High school	5,226 (36.9)
	Middle school	1,706 (12.0)
	Elementary school	3,037 (21.4)
Stress exposure	Stressful	3,911 (27.6)
	Less stressful	10,263 (72.4)
Smoking status	Former smoker	6,949 (49.0)
	Current smoker	7,225 (51.0)
Types of stop smoking treatments		
Intention to quit smoking	No	3,244 (22.9)
	Yes	10,930 (77.1)
Nicotine replacement therapy (NRT)	No	12,856 (90.7)
	Yes	1,318 (9.3)
Prescription drugs	No	14,076 (99.3)
	Yes	98 (0.7)
Education and counseling	No	13,532 (95.5)
	Yes	642 (4.5)
Telephone counseling	No	14,124 (99.6)
	Yes	50 (0.4)
Nicorette	No	13,528 (95.4)
	Yes	646 (4.6)
Acupuncture treatments	No	13,971 (98.6)
	Yes	203 (1.4)
No intervention	No	13,887 (97.8)
	Yes	287 (0.2)
Survey years	2007	1,158 (8.2)
	2008	2,748 (19.4)
	2009	3,061 (21.6)
	2010	2,582 (18.2)
	2011	2,473 (17.4)
	2012	2,152 (15.2)

bles were created as behavioral support plus prescription drugs, behavioral support plus NRT, prescription drugs without behavioral support, NRT without behavioral support, education and counseling without medications, telephone counseling without medications, and no intervention.

3) Covariates

(1) Socio-demographic variables

Gender was categorized into two groups (male, female). Age was categorized into six groups (19-29, 30-39, 40-49, 50-59, 60-64, over 65). Income level was categorized into four quartiles. Education level was categorized into four groups (graduation from university or more, graduation from high school, graduation from middle school, and graduation from elementary school).

(2) Smoking-linked variables

Stress was categorized into two groups (stressful, less stressful).

3. Statistical analysis

1) Frequency analysis

Frequency analysis was performed to examine unweighted frequencies and weighted percentages of variables. Statistical analysis was conducted using IBM® SPSS® Statistics software Version 23.0 (IBM, Armonk, NY, USA).

2) Multiple logistic regression

Multiple logistic regression was performed to analyze the effects of different types of stop smoking treatment among 2,957 South Korean adults with experience of smoking cessation interventions without an intention to quit smoking and in a no intervention control group (n = 287). The independent variables were stop smoking treatments, and the dependent variable was current smoking status. Covariates were socio-demographic and smoking-linked factors of gender, age, education level, household income level, and stress exposure. Statistical analysis was conducted using IBM® SPSS® Statistics

Table 2. Multiple logistic regression models of the associations between smoking cessation and different types of stop smoking treatments among the experimental group (n = 1,771) and no intervention control group (n = 287)

Characteristics		2007-2012 (N = 2,058)	
		Adj. odds ratio	95% C.I.
Behavioral support + Medication (Prescription drugs or NRT) vs. No intervention	No intervention	Reference	
	Education and Counseling + Prescription drugs	14.831*	[1.256, 175.136]
	Education and Counseling + NRT	3.060***	[1.971, 4.748]
Gender	Female	Reference	
	Male	0.388***	[0.278, 0.541]
Age (years)	Over 65	Reference	
	60-64	0.776	[0.453, 1.329]
	50-59	0.434**	[0.268, 0.700]
	40-49	0.296***	[0.177, 0.494]
	30-39	0.361***	[0.216, 0.604]
	19-29	0.342***	[0.194, 0.602]
Income level	1st quartile (highest)	Reference	
	2nd quartile	1.261	[0.866, 1.837]
	3rd quartile	0.922	[0.621, 1.370]
	4th quartile (lowest)	0.739	[0.461, 1.183]
Education level	University or more	Reference	
	High school	0.650*	[0.460, 0.918]
	Middle school	0.623	[0.381, 1.018]
	Elementary school	0.313***	[0.186, 0.526]
Stress exposure	Stressful	Reference	
	Less stressful	1.921***	[1.372, 2.690]

*p < 0.05, **p < 0.01 ***p < 0.001.

software Version 23.0 (IBM, Armonk).

RESULTS

Table 1 shows unweighted frequencies and weighted percentages of variables among South Korean adult smokers by survey year. Males represented 83.9% of the total sample population; 27.6% of participants reported that they suffered from stress. Forty-nine percent of the total sample population identified as former smokers. In other words, 49.0% of participants who have ever smoked have successfully quit. In addition, 77.1% of participants reported that they had tried to quit smoking using willpower alone.

Table 2 shows the calculated ORs for the association between smoking cessation and different types of stop smoking treatments among the experimental group (n = 1,771) and the no intervention control group (n = 287) after adjusting for socio-demographic and smoking-linked variables of gender, age, education level, household income level, and stress exposure. The study revealed the following: education

and counseling plus prescription drug therapy (OR = 14.831, 95% CI = 1.256 to 175.136) and education and counseling plus NRT (OR = 3.060, 95% CI = 1.971 to 4.748) were associated with increased odds of quitting success compared to no intervention. The multiple logistic regression analysis also showed significant associations between smoking cessation and gender, age, education level, and stress exposure.

Table 3 shows calculated ORs for the associations between smoking cessation and different types of stop smoking treatments among the experimental group (n = 1,825) and no intervention control group (n = 287) after adjusting for socio-demographic and smoking-linked variables of gender, age, education level, household income level, and stress exposure. Findings of the study demonstrated that the group receiving education and counseling without medications was associated with increased odds of quitting success compared to those receiving no intervention (OR = 4.944, 95% CI = 3.463 to 7.058). Individuals receiving telephone counseling without medication demonstrated increased odds of quitting success compared to those without intervention; however, the

Table 3. Multiple logistic regression models of the associations between smoking cessation and different types of stop smoking treatments among the experimental group (n = 1,825) and no intervention control group (n = 287)

Characteristics		2007-2012 (N = 2,112)	
		Adj. odds ratio	95% C.I.
Behavioral support vs. No intervention	No intervention	Reference	
	Education and Counseling	4.944***	[3.463, 7.058]
	Telephone counseling	2.994	[0.877, 10.216]
Gender	Female	Reference	
	Male	0.427***	[0.307, 0.593]
Age	Over 65	Reference	
	60-64	0.832	[0.498, 1.389]
	50-59	0.483**	[0.310, 0.752]
	40-49	0.350***	[0.218, 0.562]
	30-39	0.370***	[0.227, 0.604]
	19-29	0.370***	[0.215, 0.637]
Income level	1st quartile (highest)	Reference	
	2nd quartile	1.396	[0.963, 2.024]
	3rd quartile	1.053	[0.716, 1.550]
	4th quartile (lowest)	0.929	[0.596, 1.448]
Education level	University or more	Reference	
	High school	0.545***	[0.389, 0.762]
	Middle school	0.502**	[0.316, 0.799]
	Elementary school	0.310***	[0.190, 0.504]
Stress exposure	Stressful	Reference	
	Less stressful	1.884***	[1.361, 2.608]

*p < 0.05, **p < 0.01 ***p < 0.001.

Table 4. Multiple logistic regression models of the associations between smoking cessation and different types of stop smoking treatments among the experimental group (n = 634) and control group (n = 55)

Characteristics		2007-2012 (N = 689)	
		Adj. odds ratio	95% C.I.
Prescription drugs vs. Education and Counseling + NRT or Single NRT	Prescription drugs	Reference	
	Education and Counseling + Prescription drugs	0.875	[0.072, 10.632]
	Education and Counseling + NRT	0.325**	[0.161, 0.657]
	NRT	0.322***	[0.175, 0.593]
Gender	Female	Reference	
	Male	0.932	[0.536, 1.619]
Age	Over 65	Reference	
	60-64	0.750	[0.377, 1.491]
	50-59	0.610	[0.345, 1.079]
	40-49	0.339**	[0.181, 0.633]
	30-39	0.275***	[0.143, 0.528]
	19-29	0.184**	[0.071, 0.481]
Income level	1st quartile (highest)	Reference	
	2nd quartile	1.446	[0.903, 2.314]
	3rd quartile	1.285	[0.777, 2.127]
	4th quartile (lowest)	1.003	[0.531, 1.892]
Education level	University or more	Reference	
	High school	1.186	[0.747, 1.882]
	Middle school	1.436	[0.767, 2.690]
	Elementary school	0.978	[0.526, 1.817]
Stress exposure	Stressful	Reference	
	Less stressful	1.457	[0.964, 2.201]

*$p < 0.05$, **$p < 0.01$ ***$p < 0.001$.

difference was without statistical significance (OR = 2.994, 95% CI = 0.877 to 10.216). Multiple logistic regression analysis also showed significant associations between smoking cessation and gender, age, education level, and stress exposure.

Table 4 shows the calculated ORs for the associations between smoking cessation and different types of stop smoking treatments among the experimental group (n = 634) and control group (n = 55) after adjusting for gender, age, education level, household income level, and stress exposure. Individuals receiving education and counseling plus NRT (OR = 0.325, 95% CI = 0.161 to 0.657) and the NRT only group (OR = 0.322, 95% CI = 0.175 to 0.593) were associated with decreased odds of quitting success compared to those who received only prescription medication(s). The multiple logistic regression analysis also showed significant association between smoking cessation and age.

DISCUSSION

The purpose of this study was to analyze the effects of different types of stop smoking treatment in South Korean adult smokers without an intention to quit. Findings of this study are described below.

1. Behavioral support plus medication vs. no intervention

Multiple logistic regression analysis of the associations between smoking cessation and different types of stop smoking treatment among the experimental group (n = 1,771) and the no intervention control group (n = 287) found that the group receiving education and counseling plus a prescription drug (OR = 14.831, p < 0.05) and those receiving education and counseling plus NRT (OR = 3.060, p < 0.001) were more likely to quit smoking successfully compared to the group with no intervention. This finding is consistent with the hypothesis that behavioral support plus medi-

cations is associated with increased odds of quitting success compared to no intervention. Specifically, Carpenter et al. [4] asserted that more smokers undergoing reduction counseling plus NRT (43%) made a 24-hour longer quitting attempt over six months than smokers with no intervention (16%; p < or = .01). Chan et al. [5] claimed that, compared to the no intervention group, those receiving behavioral support plus NRT as well as those in the behavioral support group achieved higher six-month tobacco abstinence (17.0% versus 10.2%, p = 0.01) and reduction rates (50.9% versus 25.7%, p < 0.001). Grassi et al. [6] demonstrated that abstinence rates at one year were 68% in the combined counseling and prescription drug (bupropion) group and 35.3% in the group with counseling therapy alone.

2. Behavioral support without medication vs. no intervention

Multiple logistic regression analysis of the associations between smoking cessation and different types of stop smoking treatment among the experimental group (n = 1,825) and the no intervention control group (n = 287) demonstrated that education and counseling without medication was more likely to result in quit success compared to those with no intervention (OR = 4.944, p < 0.001), but the outcome for the group receiving telephone counseling without medications was not statistically significant. This finding is inconsistent with the hypothesis that behavioral support without medications is not associated with increased odds of quitting success in comparison with no intervention. Research studies on the effects of behavioral support without medications as a smoking cessation tool are controversial. Specifically, some studies have maintained that behavioral support without medication such as in-person or telephone counseling from a healthcare professional can increase the odds of quitting success [7-11]. In contrast, Glasgow et al. [12] asserted that groups receiving behavioral support without medication did not significantly increase smoking abstinence in comparison to those receiving no intervention. Haustein et al. [17] contended that the biggest reason why many smokers find it difficult to quit is their dependence on nicotine. For this reason, medications that can decrease the risk of nicotine dependence are needed to increase the quit success rate for adult smokers without an intention to

quit. Follow-up studies are needed that examine the direct effects of behavioral support without medications on adult smokers who participate in smoking cessation interventions without an intention to quit.

3. Behavioral support plus NRT or NRT only vs. prescription drug only

Multiple logistic regression analysis of the associations between smoking cessation and different types of stop smoking treatment among the experimental group (n = 634) and control group (n = 55) found that those receiving education and counseling plus NRT (OR = 0.325, p < 0.01) and those receiving NRT alone (OR = 0.322, p < 0.001) were less likely to quit smoking successfully compared to those receiving prescription drug therapy alone. This finding is consistent with the hypothesis that behavioral support plus NRT or NRT alone is associated with reduced odds of quitting success compared to prescription drug therapy alone. Specifically, Brose et al. [15] claimed that, even though NRT is commonly used as smoking cessation medication, the short-term (four-week) quit rate for NRT (44%) was lower than that for prescription drugs (59%) such as varenicline and bupropion. Jorenby et al. [18] asserted that the one-year continuous abstinence rate for bupropion (18%) was higher than that of NRT (10%). Hughes [19] found that at least 70% of smokers who tried to quit using NRT relapsed within one year. Although the mechanisms through which prescription drugs increase abstinence rates are not clearly defined, it has been suggested that prescription drugs such as bupropion help smokers quit through the suppression of the neuronal reuptake of dopamine and noradrenaline, which can reduce the risk of nicotine dependence and withdrawal symptoms [20].

Results of this study should be considered in light of several limitations. First, self-reported survey data were used to create categorical and grouping variables associated with stop smoking treatments, which might have skewed the findings. Second, a relatively small sample size was analyzed because health interviews and nutrition surveys were conducted via self-reported surveys, which may yield significant missing values. Third, many different types of prescription drugs are used in quit smoking strategies. However, it was impossible to compare the effects of different types of pre-

scription drugs, because the study utilized data from the Korea National Health and Nutrition Examination Survey, which did not focus on specific data for tobacco. Hence, this dataset did not allow for sophisticated analysis on the pharmacotherapy of smoking cessation.

Despite the above limitations, the current study does contribute to the literature on the development of smoking cessation interventions for adult smokers without an intention to quit. Also, it provides worthy information on recent trends in stop smoking treatments. This study's findings suggest that education and counseling plus prescription drugs is the most successful type of stop smoking treatment for South Korean adult smokers without an intention to quit. This is especially alarming because most adult smokers who want to quit smoking have only a small chance of long-term success due to nicotine dependence and withdrawal symptoms such as poor concentration, depression, and irritability [21]. Hence, appropriate and effective smoking cessation interventions are needed to increase the success rate of quitting smoking for adult smokers.

ACKNOWLEDGEMENTS

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