

RESEARCH ARTICLE

Association of Cigarette Prices with the Prevalence of Smoking in Korean University Students: Analysis of Effects of the Tobacco Control Policy

Jin-Ok Han¹, Jeong-Soo Im¹, Jun Yim¹, Yoon-Hyeong Choi¹, Kwang-Pil Ko¹, Junghoon Kim¹, Hee Gerl Kim², Yunhong Noh³, Young-Khi Lim^{4*}, Dae-Kyu Oh^{1**}

Abstract

Background: Increased pricing of cigarettes might be one of the most effective approaches for reducing the prevalence of smoking. This study aimed to investigate the effects of increasing cigarette prices through taxation by a tobacco intervention policy on the changes in smoking prevalence in Korean university students. **Materials and Methods:** The participants in this study were 23,047 healthy university students aged 18-29 years from a health examination in 2011-2015. We investigated the adjusted prevalence of daily and occasional smoking before and after increasing cigarette prices through taxation. **Results:** The prevalence of occasional smoking was significantly decreased in 2015 from 2014 in both male (from 10.7% in 2014 to 5.4%) and female (from 3.6% to 1.1%) students, but the prevalence of daily smoking did not decrease significantly. The frequency of individuals who had attempted smoking cessation during the past year was significantly higher among occasional smokers in male students (90.2%) compared with daily smokers (64.9%). For female students, there were no differences in experience of smoking cessation, willingness for smoking cessation, or E-cigarette experience between daily and occasional smokers. **Conclusions:** We found that a policy of increasing cigarette prices through taxation is associated with decreases in the prevalence of occasional smokers, who have relatively lower nicotine dependence compared with individuals who smoke daily. The results of our study suggest that social support and direct intervention for smoking cessation at the community level are needed for university students alongside the pricing policy.

Keywords: Smoking - tobacco control policy - cigarette prices - university student

Asian Pac J Cancer Prev, 16 (13), 5531-5536

Introduction

Smoking is a major worldwide public health problem that is known to have an important pathogenic role in the increasing incidence of cancer and its subsequent mortality (Ahmed, 2013; Alshammari et al., 2015). In addition, smoking is a key factor in the development of cancer of the lung, head and neck, nasopharynx, esophagus, stomach, pancreas, liver, kidney, bladder, and cervix, as well as leukemia (Alshammari et al., 2015). A recent study also suggests that smoking contributes to the pathogenesis of cancer, as well as coronary heart disease, stroke, and obstructive pulmonary disease (Waters et al., 2015). Moreover, the World Health Organization (WHO) reported that approximately 400 million deaths per year are directly or indirectly attributable to smoking-related diseases, and a recent study estimated that there will be 1000 million deaths per year due to smoking by 2020 (Kim, 2012).

In South Korea, the smoking prevalence of 42.1% in males and 6.2% in females is higher than the average prevalence (20.3%) among the Organization for Economic Cooperation and Development (OECD) countries in 2013 (Ministry of Health & Welfare, 2014). Lifestyle changes dramatically when adolescents transition to being university students from being in high school. Particularly, the probability of starting smoking increases in university students. In fact, an epidemiological study suggests that most tobacco users begin as adolescents or young adults, and individuals who reach their mid-20s as nonsmokers are unlikely to ever become tobacco users (Aldrich et al., 2015). Moreover, smoking prevalence is twice as high in male young adults in their 20s (43.1%) as in male high school students (18.1%) in South Korea (Kim and Song, 2013). Thus, interventions for smoking cessation are very important, particularly in adolescents, because the formation of healthy lifestyles in adolescents affects

¹Department of Preventive Medicine, Gachon University College of Medicine, ²College of Nursing, Gachon University, Sunghnam, ³Medical Campus, Gachon University, Incheon, ⁴Department of Radiological Science, Gachon University College of Medicine, Incheon, Republic of Korea *For correspondence: yklim@gachon.ac.kr and jsodk@gachon.ac.kr

their health behavior and health status after middle-age.

In South Korea, a wide-ranging tobacco control policy has been executed for a “cigarette smoke-free and clean environment”, including education and public relations for smoking cessation and, support programs for smokers. However, Korea has long kept its increasing rate of cigarette taxes below the OECD standard (Jung and Ko, 2014), and the price of cigarettes is the lowest in OECD countries (OECD, 2013). Nevertheless, the Korean government has been reluctant to increase the price of cigarettes through taxes since 2005, although it explicitly banned producers from passing the tax increase onto consumers (Lee et al., 2014). In 2015, the Korean government implemented an unprecedented tobacco control policy that caused an 80% increase in the price of cigarettes (i.e., raised the price of cigarettes from won2500 to won4500), and the area in which smoking is banned was expanded to include all general eateries (Ministry of Health & Welfare, 2015b).

Many previous studies have shown that tobacco control policies are effective for reducing smoking prevalence (Levy et al., 2012b; Klumbiene et al., 2015). Of these policies, the most effective approach for reducing the prevalence of smoking has been increasing the price of cigarettes (Lee et al., 2014). Increased cigarette prices are associated with the intention of targeting non-smokers, particularly in youth populations (Kim et al., 2012). However, this policy, which was implemented in South Korea and increased cigarette prices, has not been formally investigated because it is still fairly recent. Therefore, this study aimed to investigate the effects of a policy intervention for tobacco that increases cigarette prices through taxation on the changes in smoking prevalence in Korean university students.

Materials and Methods

Participants

The participants in this study were 23,047 healthy youths aged 18-29 years from the health examination for students that is conducted every year at Gachon University (South Korea). This health examination is performed for target setting and evaluation, including a comprehensive plan for health promotion and programs, by analyzing the data from the health status and health-related behavior in university students. Although this health examination is targeted for the entire student body, it was limited to freshmen and was unavailable to some students in 2015. The response rates for the health-related questionnaire were 30.4%, 24.6%, 26.1%, 24.5%, and 76.6% in the year 2011-2015, respectively. This study was approved by the Ethical Committee of the Institute of Clinical Medicine at the Gachon University (IRB No. 1044396-201504-HR-018-01). Written informed consent was obtained from all participants.

Smoking

We measured smoking status, experience of smoking cessation, willingness for smoking cessation, and E-cigarette experience using a health behavior questionnaire in each year. In this study, the smoking of

Table 1. General Characteristics of Study Population

	2011 year (n=3735)			2012 year (n=5820)			2013 year (n=5827)			2014 year (n=4594)			2015 year (n=3071)		
	Male (n=1763)	Female (n=1972)	p-value	Male (n=2730)	Female (n=3090)	p-value	Male (n=2480)	Female (n=3347)	p-value	Male (n=1829)	Female (n=2765)	p-value	Male (n=1275)	Female (n=1796)	p-value
age(mean±SD)	22.6 ± 3.0	21.1 ± 2.1	<0.01	21.4 ± 3.5	20.7 ± 2.5	<0.01	22.9 ± 2.9	22.0 ± 2.0	<0.01	23.3 ± 2.8	22.2 ± 2.0	<0.01	20.8 ± 2.5	20.2 ± 1.9	<0.01
School year (n(%))															
Freshman	621 (35.2)	640 (32.5)	<0.01	1738 (63.7)	1703 (55.1)	<0.01	1254 (50.6)	1394 (41.7)	<0.01	754 (41.2)	1032 (37.3)	0.001	866 (67.9)	1151 (64.1)	0.141
Sophomore	115 (6.5)	166 (8.4)		48 (1.8)	21 (0.7)		160 (6.5)	326 (9.4)		116 (6.3)	235 (8.5)		87 (6.8)	146 (8.1)	
Junior	204 (11.6)	317 (16.1)		7 (0.3)	13 (0.4)		209 (8.4)	457 (13.7)		278 (15.2)	494 (17.9)		179 (14.0)	267 (14.9)	
Senior	823 (46.7)	849 (43.1)		937 (34.3)	1353 (43.8)		857 (34.6)	1170 (35.0)		681 (37.2)	1004 (36.3)		143 (11.2)	232 (12.9)	
Residential type (n (%))															
Living with family	1527 (86.6)	1650 (83.7)	<0.01	2519 (92.3)	2795 (90.5)	0.005	2147 (86.7)	2787 (83.2)	<0.01	-	-	-	991 (74.6)	1482 (79.5)	<0.01
Living alone	180 (10.2)	198 (10.0)		184 (6.7)	259 (8.4)		284 (11.5)	440 (13.1)		-	-	-	271 (20.4)	281 (15.1)	
Dormitory	50 (2.8)	119 (6.0)		18 (0.7)	36 (1.2)		43 (1.7)	118 (3.5)		-	-	-	54 (4.1)	97 (5.2)	
Other	7 (0.4)	5 (0.3)		7 (0.3)	0 (0.0)		3 (0.1)	3 (0.1)		-	-	-	12 (0.9)	5 (0.3)	
Alcohol consumption (n (%))															
No	46 (2.8)	118 (6.4)	<0.01	81 (3.1)	158 (5.5)	<0.01	257 (11.2)	730 (24.9)	<0.01	51 (2.9)	108 (4.2)	0.004	26 (2.0)	79 (4.6)	<0.01
Yes	1604 (97.2)	1725 (93.6)		2500 (96.9)	2702 (94.5)		2029 (88.8)	2202 (75.1)		1685 (97.1)	2493 (95.9)		1307 (98.1)	1659 (95.5)	

p-value using t-test for continuous variables and chi-square test for categorical variables; Residential type was not available in 2014.

any cigarette product was included. The definition of a smoker in this study was someone who smokes any type of cigarette product at least once per day. Participants were asked to answer the question "how many days did you smoke more than once during the past a month?" in 2011-2014. Participants who reported any smoking were asked to answer as '1-2 days/month', '3-5 days/month', '6-9 days/month', '10-19 days/month', '20-29 days/month', or 'daily'. In 2015, participants reported as 'never smoking', 'occasional smoking', or 'daily smoking'. Smoking statuses were classified as never smokers, occasional smokers (or 1-29 times/month) or daily smokers (or ≥ 30 times/month).

Experience of smoking cessation was also assessed by a simple 1-item question using a self-report questionnaire. Participants were asked to answer the question "have you attempted smoking cessation more than once during the past year?" We defined participants who reported "Yes" as having experience of smoking. Willingness for smoking cessation was also defined as participants who reported "Yes" to having a plan to quit smoking in the future.

Demographic variables and other health behavior

Demographic and other health behavior variables, including age, sex, grade, type of residence, and alcohol intake, were measured using a general health

questionnaire. Grade was classified by academic year (years 1-4). Type of residence was classified as 'living with family', 'living alone', 'dormitory', or 'other'. We classified alcohol consumption as Yes (\geq once in the past year) or No (never).

Data analysis

Chi-square tests were used to compare the differences in grade, type of residence, and alcohol consumption by sex. We estimated the frequency of daily, occasional, and never smokers from 2011 to 2015. Moreover, the prevalence of smoking was adjusted for response rate, which was analyzed using the direct standardization method. We also determined the differences in experience of smoking cessation, willingness for smoking cessation, and E-cigarette experience by daily or occasional smokers using Chi-square tests. All data were analyzed using SAS ver. 9.3 (SAS Institute Inc., Cary, NC, USA). Values of $P < 0.05$ were considered statistically significant. Values were expressed as the mean (standard deviation, SD) or %.

Results

The characteristics of the participants are presented in Table 1. The numbers of students in freshman and senior were higher than those in sophomore and junior for every year. In 2011, the mean age was 22.6 years (SD, 3.0) in males and, 21.1 years (SD, 2.1) in females. The frequency of individuals who lived with family was 86.6% in males and, 83.7% in females. Alcohol use was 97.2% in males and 93.6% in females. When stratified by each year, these trends were broadly consistent (Table 1).

Figure 1 shows the adjusted prevalence of smoking according to each year. For male students, despite a linear decrease between 2011 and 2014, the prevalence of daily smoking increased from 18.5% in 2014 to 21.5% in 2015, although this change was not statistically significant. However, the prevalence of occasional smoking significantly decreased from 10.7% in 2014 to 5.4% in 2015. For female students, the prevalence of occasional smoking significantly decreased from 3.6% in 2014 to 1.1% in 2015, but daily smoking did not decrease.

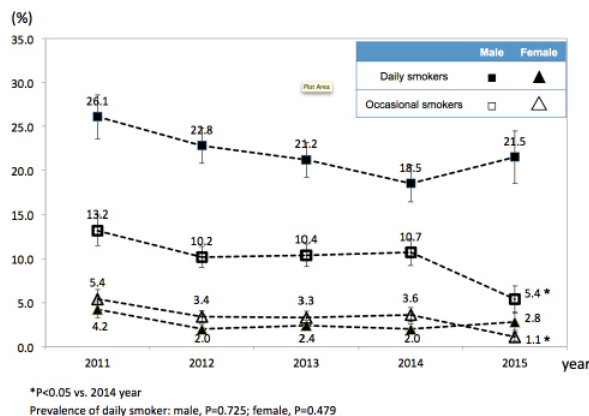


Figure 1. Shows the Adjusted Prevalence of Smoking According to Each Year

Table 2. Experience of Smoking Cessation, Willingness for Smoking Cessation, and E-cigarette Experience in Daily-and Occasional Smokers

	Male		p-value	Female		p-value
	daily smokers	occasional smokers		daily smokers	occasional smokers	
Experience of smoking cessation within 1 year (n (%))						
Yes	141 (64.98)	46 (90.20)	0.001	28 (71.79)	17 (89.47)	0.185
No	76 (35.02)	5 (9.80)		11 (28.21)	2 (10.53)	
Willingness for smoking cessation (n (%))						
Planning for cessation within one month	58 (26.61)	37 (72.55)	<.001	7 (17.95)	7 (36.84)	0.308
Planning for cessation within six months	50 (22.94)	5 (9.80)		10 (25.64)	4 (21.05)	
Planning for cessation someday	61 (27.98)	6 (11.76)		18 (46.15)	5 (26.32)	
No plan for cessation	49 (22.48)	3 (5.88)		4 (10.26)	3 (15.79)	
E-cigarette experience within one month (n (%))						
Yes	63 (63.64)	13 (54.17)	0.483	14 (73.68)	2 (100.0)	>.999
No	36 (36.36)	11 (45.93)		5 (26.32)	0 (0.0)	

p-value using chi-square test; p-value using Fisher's exact test (n<5)

Table 2 shows the results of the analyses of experience of smoking cessation, willingness for smoking cessation, and E-cigarette experience in daily and occasional smokers. For male students, the frequency of individuals who reported attempting smoking cessation during the past year is significantly higher in occasional smokers (90.2%) than in daily smokers (64.9%). Similarly, the willingness for smoking cessation is also significantly higher in occasional smokers (72.5%) than in daily smokers (26.6%). In addition, 22.4% of daily smokers reported that the willingness for smoking cessation is not at all despite being 5.8% in occasional smokers. There was no difference in E-cigarette experience between daily smokers and occasional smokers. For female students, there was no difference in experience with smoking cessation, willingness for smoking cessation, and E-cigarette experience in either daily or occasional smokers.

Discussion

Smokers have unhealthier behavior (Berrigan et al., 2003) and lower compliance with cancer screening compared with non-smokers (Shapiro et al., 2001). Particularly, young people are known to be more vulnerable to nicotine addiction owing to physiological and psychological factors (National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health, 2012; Waters et al., 2015). Moreover, young populations may underestimate the harmfulness of nicotine and may believe that they could easily quit (National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health, 2012). In a national-based study in 24 countries, it was found that the average prevalence of smoking was 13.3% (22.4% in males, and 6.6% in females) in university students (Peltzer and Pengpid, 2014). In the present study, despite observing a similar trend in the prevalence of daily smoking, which was 21.5% in males and 2.8% in females, the prevalence of occasional smoking was slightly lower (5.4% in males, and 1.1% in females). However, there is a possibility that there are hidden smokers among female students because of social prejudice against women smokers. In fact, in a Korean university student study, significant differences were found between self-reported smoking rates and smoking rates from urine analysis in females (Lee et al., 2009).

In a previous study, that evaluated the effect of tobacco control policies in Lithuania, it was reported that tobacco control policies were more effective in the older population compared with the younger population (20–44 years old) (Klumbiene et al., 2015). Another tobacco control policy study also indicated that tobacco control is more effective in younger populations (Messer et al., 2007). By contrast, it has been suggested that smoke-free legislation has a low impact on tobacco control. The results of an investigation into the policies of smoking control showed that young smokers lack motivation for smoking cessation due to this population believing that the harmful effects of smoking are insignificant (Martinez et al., 2014).

Smoking control policy is difficult to evaluate alone

because there are limitations in distinguishing the effects of different policies (Levy et al., 2012a). An investigation of the SimSmoke Policy in Brazil, showed that an increase in cigarette pricing policy, smoke-free air laws, marketing restrictions, health warnings, an anti-smoking mass media campaign and cessation treatment programs were associated with decreases of 46%, 14%, 14%, 8%, 6%, and 10%, respectively, in the prevalence of smoking (Levy et al., 2012a). A study that investigated the association between cigarette prices and cigarette consumption has reported that there is a negative correlation (The Campaign for Tobacco-Free Kids, 2015); a 10% increase in cigarette prices is associated with a 4% decrease in cigarette consumption (Chaloupka et al., 2012). After increasing cigarette prices compared with 2014, occasional smokers were significantly decreased in both males and females. Increasing the tobacco price generally results in a decrease in tobacco consumption, the approach was reported to be effective even after only 6 months in 2013 in Minnesota, USA (Amato et al., 2015). All youth populations are price-sensitive (Kostova et al., 2011), and lower tobacco prices are associated higher youth smoking (Chaloupka et al., 2012; Kim et al., 2013).

It is well known that 30% of cancer-related mortalities could be prevented by modifying key risk factors, such as smoking, obesity, unhealthy diet, physical inactivity, and heavy drinking (Ahmed et al., 2014). However, efforts to quit smoking have not been carried out effectively due to a lack of social support and a lack of understanding on harmful effects by smoking (Alshammari et al., 2015). Smokers have mentioned lacking resources, time and support as the main reasons for not succeeding in smoking cessation (Sarna et al., 2001; Bodner et al., 2011). In addition, a lack of understanding regarding the harmful effects of smoking is associated with cigarette consumption, particularly in young populations (Steptoe et al., 2002). Although the harmful effects of nicotine in cancer are well known, the risk for other health outcomes is relatively poorly understood in the general population. For example, the association between smoking and lung cancer are understood in 83.6% of university students, but only 46.5% understood the effects of smoking on cardiovascular disease (Levy et al., 2012a).

Experience of smoking cessation in our subjects (daily smoker: 64.9%; occasional smoker: 90.2%) was higher than that in the general population of Korean individuals aged 20–29 years (50.5%) included in the Korean National Health and Nutrition Examination Survey (2013) (Centers for Disease Control and Prevention, 2013). Furthermore, the frequency of females who have experience of smoking cessation was also higher in our study (daily smoker: 71.7%; occasional smoker: 89.4%) than in the general Korean population (69.4%). These differences may be interpreted to be due to the tobacco control policy that was started in January 2015. In fact, after increasing cigarette prices, the numbers of individuals who attempted smoking cessation by visiting the clinic center or public health centers began increasing, which may suggest increasing willingness for smoking cessation in Korean smokers (Ministry of Health & Welfare, 2015a).

Despite the decreased prevalence of occasional

smoking, there was a lack of change in daily smoking, which may be due to a higher nicotine dependence in daily smokers compared with individuals who are occasional smokers. Thus, increased cigarette price policies are more effective in occasional smokers who have relatively lower nicotine dependence. Anti-tobacco information campaigns play a role in reducing the social acceptability of smoking (Rennen et al., 2014; Klumbiene et al., 2015). Moreover, the reduced social acceptance of smoking is associated with smoking cessation and willingness for smoking cessation (Hammond et al., 2006). In this respect, a strategy for smoking cessation that includes public health messages, such as those that emphasize the risk of nicotine addiction, is also needed (Waters et al., 2015). Thus, for university student smokers, altering the social atmosphere through an increased cigarette price policy, as well as education and anti-tobacco information campaigns for smoking cessation at the community level, may be very important.

Several limitations in the present study should be considered. A major limitation of this study is that we cannot infer causality or specify the direction of the effect because the reasons for stopping tobacco usage were not measured. However, in previous research on smoking in Korean university students, 32.7% of current smokers reported that they would quit smoking if cigarette prices increased (Lee and Kim, 2014). A second limitation of this study was that the assessment items of self-reported smoking status were not matched completely between 2015 and other years. Although, this may also represent a limitation of our study, smoking status was categorized into 3 groups to minimize error. Third, the prevalence of smoking in female students may have been underestimated. Despite the fact that cotinine-verified smoker prevalence was 13.9% in females, only 5.3% of females self-reported to be smokers in the Korea national representative data (Jung-Choi et al., 2012). In addition, in the Korea Cancer Screening Adherence Study, 6.7% of females who self-reported to be never smoker were defined as smokers as determined by cotinine verification (Ko et al., 2015). The underestimation of smoking status in female smokers is a rising issue (West et al., 2007). Finally, this study was conducted among students at one university in a small area of Korea. Therefore, our current findings may not be generalizable to the overall Korean university student population. Despite these limitations, our findings are important from a public health perspective, particularly in terms of designing interventions aimed at smoking cessation among Korean university students.

In conclusion, our findings indicate that a policy of increasing cigarette prices through taxation was associated with a significantly decreasing prevalence of occasional smoking, but not daily smoking. Therefore, this approach may be effective for the occasional smoker who has relatively lower nicotine dependence than individuals who smoke daily. Thus, for the daily smoking student, social support and intervention for smoking cessation at the community level may be necessary. In addition, future study need to carry out at the national level to evaluate the effectiveness of the tobacco pricing policy in Korea, and evidence-based policy should be conducted. .

Acknowledgements

This work was supported in part by the Research center for student health at Gachon University, Korea. We thank the participants and clinical teams for their collaboration and work in helping with recruitment.

References

- Ahmed HG (2013). Survey on knowledge and attitudes related to the relation between tobacco, alcohol abuse and cancer in the northern state of Sudan. *Asian Pac J Cancer Prev*, **14**, 2483-6.
- Ahmed HG, Eltom FM, Doumi MA (2014). Burden of cancer in north sudan: a community-based survey. *Egypt Acad J Biolog Sci*, **6**, 55-63.
- Aldrich MC, Hidalgo B, Widome R, et al (2015). The role of epidemiology in evidence-based policy making: a case study of tobacco use in youth. *Ann Epidemiol*, **25**, 360-5.
- Alshammari FD, Khalifa AM, Kosba AA, et al (2015). Assessment of perception of medical students in regard to links between tobacco or alcohol use and cancer. *Asian Pac J Cancer Prev*, **16**, 2697-700.
- Amato MS, Boyle RG, Brock B (2015). Higher price, fewer packs: evaluating a tobacco tax increase with cigarette sales data. *Am J Public Health*, **105**, 5-8.
- Berrigan D, Dodd K, Troiano RP, et al (2003). Patterns of health behavior in U.S. adults. *Prev Med*, **36**, 615-23.
- Bodner ME, Miller WC, Rhodes RE, et al (2011). Smoking cessation and counseling: knowledge and views of Canadian physical therapists. *Phys Ther*, **91**, 1051-62.
- Chaloupka FJ, Yurekli A, Fong GT (2012). Tobacco taxes as a tobacco control strategy. *Tob Control*, **21**, 172-80.
- Hammond D, Fong GT, Zanna MP, et al (2006). Tobacco denormalization and industry beliefs among smokers from four countries. *Am J Prev Med*, **31**, 225-32.
- Jung-Choi KH, Khang YH, Cho HJ (2012). Hidden female smokers in Asia: a comparison of self-reported with cotinine-verified smoking prevalence rates in representative national data from an Asian population. *Tob Control*, **21**, 536-42.
- Jung Yh, Ko Sj (2014). Composite indicator for tobacco control policy in Korea. *Health and Social forum*, **211**, 1226-3648.
- Kim AE, Loomis BR, Busey AH, et al (2013). Influence of retail cigarette advertising, price promotions, and retailer compliance on youth smoking-related attitudes and behaviors. *J Public Health Manag Pract*, **19**, 1-9.
- Kim EK, Song MR (2013). An analysis of the characteristics and preferences related to a smoking cessation program among smoking college students. *J Korean Biol Nurs Sci*, **15**, 184-92.
- Kim HC, Cho KS, Kwon SM, et al (2012). The effect of the increase in tobacco price on adolescent smoking in Korea : smoking reduction and brand switching. *Health and Social*, **32**, 429-60.
- Kim MK (2012). (The) influence of smoking cessation stage on effectiveness of anti-smoking psas : emphasis on the message type and the message appeal type. master's thesis.
- Klumbiene J, Sakyte E, Petkeviciene J, et al (2015). The effect of tobacco control policy on smoking cessation in relation to gender, age and education in Lithuania, 1994-2010. *BMC Public Health*, **15**, 181.
- Ko YJ, Kim S, Kim KH, et al (2015). Cancer screening adherence of asian women according to biochemically-verified smoking status: Korea national health and nutrition examination survey. *Asian Pac J Cancer Prev*, **16**, 4081-8.
- Kostova D, Ross H, Blecher E, et al (2011). Is youth smoking responsive to cigarette prices? Evidence from low- and

- middle-income countries. *Tob Control*, **20**, 419-24.
- Lee CY, Shin S, Lee HK, et al (2009). Validation of self-report on smoking among university students in Korea. *Am J Health Behav*, **33**, 540-9.
- Lee HO, Kim AJ (2014). Analysis of smoking characteristics and oral health practice in health and non-health related majors. *J Dent Hyg Sci*, **14**, 183-90.
- Lee M, Lim S, Lee S, et al (2014). Analyzing issues and a status investigation of studies on tobacco control policies in South Korea. *Health Social*, **34**, 165-91.
- Levy D, de Almeida LM, Szklo A (2012a). The Brazil SimSmoke policy simulation model: the effect of strong tobacco control policies on smoking prevalence and smoking-attributable deaths in a middle income nation. *PLoS Med*, **9**, 1001336.
- Levy DT, Blackman K, Currie LM, et al (2012b). SimSmokeFinn: how far can tobacco control policies move Finland toward tobacco-free 2040 goals? *Scand J Public Health*, **40**, 544-52.
- Martinez C, Fu M, Martinez-Sanchez JM, et al (2014). Impact of a long-term tobacco-free policy at a comprehensive cancer center: a series of cross-sectional surveys. *BMC Public Health*, **14**, 1228.
- Messer K, Pierce JP, Zhu SH, et al (2007). The California tobacco control program's effect on adult smokers: (1) Smoking cessation. *Tob Control*, **16**, 85-90.
- Ministry of Health & Welfare 2014. Titl, Sejong, Welfare MoH.
- Ministry of Health & Welfare. 2015a. 2015 register for smoking cessation program in public health clinic [Online]. Osong: Ministry of Health & Welfare.
- Ministry of Health & Welfare 2015b. Titl, Sejong, Welfare MoH.
- National Center for Chronic Disease Prevention and Health Promotion (US) Office 2012. Titl, Atlanta GA.
- OECD publishing 2013. OECD Factbook 2013, OECD publishing.
- Peltzer K, Pengpid S (2014). Tobacco use, beliefs and risk awareness in university students from 24 low, middle and emerging economy countries. *Asian Pac J Cancer Prev*, **15**, 10033-8.
- Rennen E, Nagelhout GE, van den Putte B, et al (2014). Associations between tobacco control policy awareness, social acceptability of smoking and smoking cessation. Findings from the international tobacco control (ITC) Europe surveys. *Health Educ Res*, **29**, 72-82.
- Sarna L, Wewers ME, Brown JK, et al (2001). Barriers to tobacco cessation in clinical practice: report from a national survey of oncology nurses. *Nurs Outlook*, **49**, 166-72.
- Shapiro JA, Seeff LC, Nadel MR (2001). Colorectal cancer-screening tests and associated health behaviors. *Am J Prev Med*, **21**, 132-7.
- Step toe A, Wardle J, Cui W, et al (2002). An international comparison of tobacco smoking, beliefs and risk awareness in university students from 23 countries. *Addiction*, **97**, 1561-71.
- The Campaign for Tobacco-Free Kids. 2015. Increasing the federal tobacco tax reduces tobacco use [Online]. Washington, DC: The Campaign for Tobacco-Free Kids.
- Waters EA, Janssen E, Kaufman AR, et al (2015). The relationship between young adult smokers' beliefs about nicotine addiction and smoking-related affect and cognitions. *J Cancer Educ*.
- West R, Zatonski W, Przewozniak K, et al (2007). Can we trust national smoking prevalence figures? Discrepancies between biochemically assessed and self-reported smoking rates in three countries. *Cancer Epidemiol Biomarkers Prev*, **16**, 820-2.