KJFM

■ Original Article

Effect of Increasing Tobacco Prices on Stages of Smoking Cessation: A Korean Nationwide Data Analysis

Jihye Kwon, Hyunji Kim, Hyoeun Kim*, Sunmi Yoo, Seung Guk Park

Department of Family Medicine, Inje University Haeundae Paik Hospital, Busan, Korea

Background: In 2015, tobacco prices significantly increased in Korea as part of the government's smoking cessation policy. This study examined the changes in the stages of smoking cessation among Korean male smokers before and after the implementation of the tobacco price policy, and identified the predictors of such changes.

Methods: The study population comprised 3,533 male current smokers (age ≥19 years) who participated in the Korea National Health and Nutrition Survey in 2012, 2013, 2015, and 2016. Current smokers were defined as persons who had smoked ≥100 cigarettes during their lifetime and are continuing to smoke. In accordance with the transtheoretical model, smokers were classified into the precontemplation stage (no plan to quit), contemplation stage, and preparation stage (planning to quit within 6 months). We examined the changes in the smoking cessation stages before and after the implementation of the policy. Multivariate logistic regression analysis was conducted to identify factors related to the likelihood of continuing smoking, after adjustments for potential confounders.

Results: Immediately after the policy implementation, the percentage of smokers in the precontemplation stage decreased from 65.6% to 60.8% (P=0.014). However, this effect was temporary. Significant risk factors for remaining in the precontemplation stage were older age (odds ratio [OR], 1.010; 95% confidence interval [CI], 1.002–1.018; P=0.004), being in the lowest income quartile (OR, 1.226; 95% CI, 1.001–1.502; P=0.049), and manual worker or unemployed status (OR, 1.256; 95% CI, 1.036–1523; P=0.020).

Conclusion: Increasing tobacco prices only temporarily change the stage of smoking cessation among Korean male smokers.

Keywords: Tobacco; Smoking Cessation; Male; Stages of Change; Commerce

KJFM

INTRODUCTION

Cigarette smoking is a well-known major cause of various chronic diseases, including cancer and cardiovascular and lung diseases.[1,2] Annually, >7 million people die of tobacco related-diseases worldwide.[1] In Korea, approximately 58,000 people experience premature death related to smoking each year.[2] Reducing the smoking prevalence could help reduce the national health-care spending and prevent individual health problems. Many countries have taken great efforts to reduce the prevalence of smoking. Korea has also been taking great efforts to implement the policy of the Framework Convention on Tobacco Control, an international tobacco control policy. For example, tobacco prices were increased in January 2015. Previous studies have shown that higher tobacco prices enhance a person's motivation to quit smoking.[3]

The prevalence of smoking in Korea has decreased after the implementation of the tobacco price policy, and studies have found that the increase in tobacco prices has led to the reduction of smoking rates.[4] However, no study has examined the changes in the stages of smoking cessation among smokers after the tobacco price increase in Korea. According to the transtheoretical model proposed by DiClemente et al.,[5] the process of smoking cessation consists of five steps: precontemplation, contemplation, preparation, action, and maintenance.[6] During the first three steps, a smoker considers quitting smoking in the future. Studies have shown that the quit rates are 2 times higher when smokers transition from the precontemplation to the contemplation stage.[7,8] We hypothesized that an increase in tobacco prices will have a positive effect on a smoker's position within the five stages of smoking cessation, even if it may not result in a successful smoking cessation.

By using the transtheoretical model as the theoretical framework of this study, we aimed to examine the changes in the readiness to quit among smokers before and after the implementation of the tobacco price policy, and to identify related factors that may contribute to being in the precontemplation, contemplation, and preparation stages. To address these objectives, we used nationwide data that had been collected as part of the Korea National Health and Nutrition Examination Survey. Therefore, the present findings are expected to clarify whether an increase in tobacco prices is effective in changing the stages of smoking cessation among Korean adult (age ≥19 years) male smokers.

METHODS

1. Study Population

In this study, we analyzed integrated data that were collected as part of the Korea National Health and Nutrition Examination Survey in 2012, 2013, 2015, and 2016. The plan to increase tobacco prices from 2,500 won to 4,500 won from January 1, 2015, was announced during the second half of 2014. As this event was expected to confound the results, the data of the participants of the 2014 survey were excluded. Before examining the changes in smoking rates and the percentage of participants who belonged to each stage of smoking cessation before and after the increase in tobacco prices in 2015, we aimed to delineate the trends that underlie smoking rates and the stages of smoking cessation within the last 10 years. For this purpose, data that were collected as a part of the Korea National Health and Nutrition Examination Survey between 2008 and 2017 were additionally obtained. The Korea National Health and Nutrition Examination Survey uses complex stratified sampling to collect representative data of the sociodemographic characteristics, health status, and related behaviors (including smoking) of Koreans. Of a total of 10,710 Korean male adults (age ≥19 years) who were surveyed, 3,533 were current smokers at the time of the survey and analyzed as participants of this study.

2. Smoking Status and Smoking Cessation Stages

Health interview data were analyzed. Self-report measures were used, and face-to-face interviews were conducted by well-trained health interviewers. During these health interviews, the following details were collected: household characteristics, smoking status, alcohol use, mental health status, educational level, and socioeconomic status. Some of these variables were redefined in accordance with the aims of this study.

Current smokers were defined as persons who had smoked ≥100 cigarettes during their lifetime and were continuing to smoke at the time of the survey. They were divided into two groups to compare the general characteristics of smokers, namely before (2012 and 2013; n=1,778) and after (2015 and 2016; n=1,755) the policy-driven increase in tobacco prices. The process of smoking cessation consists of five stages: precontemplation, contemplation, preparation, action, and maintenance.[5,6] A respondent who answered "no" to the question "Are you planning to quit smoking within the next 6 months?" was considered to belong to the precontemplation stage; this indicated that the respondent had not considered quitting smoking. A respondent who answered "yes" to the question "Are you planning to quit smoking within the next 1 month?" was considered to belong to the preparation stage; this indicated that the respondent had been preparing to quit smoking within the next 1 month. Smokers who were in the contemplation stage were those who were planning to quit smoking not within the next 1 month but within the next 6 months. For analytic purposes, we divided the participants into two groups based on the stage of smoking cessation to which they belonged: those who intended to quit smoking (contemplation or preparation) and those who had never considered smoking cessation (precontemplation).

The effect of the implementation of the tobacco price policy on the stages of smoking cessation was examined in relation to the following variables: age (in years), marital status (living with a spouse or living alone), area of residence (rural or urban), individual income (lowest or higher quartile), educational level (<9 years of education or higher education), occupational status (nonmanual or manual worker), number of cigarettes smoked per day (more than one pack of cigarettes per day: yes or no), heavy drinking (yes or no), comorbidities (i.e., hypertension, dyslipidemia, diabetes mellitus, angina, myocardial infarc-

tion, or stroke diagnosed by a doctor), subjective health status (poor or good), stress level (high or low), and pulmonary function (abnormal or normal).

With respect to the definition of areas of residence, Seoul, Gyeonggi, and six major metropolitan cities were classified as urban areas. Eight provinces including Jeju were classified as rural areas. Farmers, fishermen, craft and related-trade workers, plant and machine operators and assemblers, elementary occupation workers or armed forces personnel, housewives, students, and unemployed individuals were classified as "manual workers or unemployed." Managers, professionals, clerical support workers, and service and sales workers were classified as "nonmanual workers." Heavy drinking was defined as the consumption of more than seven glasses of alcohol per day. Stress level was assessed using the following question: "Do you experience a lot of stress in your daily life?" The response options were "extremely stressed," "quite," "a little," and "not at all stressed." If a participant chose the "extremely stressed" or "quite" options, he was considered to have high levels of stress. Subjective health status was assessed using the following question: "Do you think you are healthy?" The response options were "very good," "good," "fair," "poor," and "very poor." Those who chose the "poor" and "very poor" response options were considered to have poor subjective health.

A dry rolling-seal spirometer (model 2130; SensorMedics, Yorba Linda, CA, USA) was used to assess pulmonary function. The forced expiratory volume in 1 second (FEV_1) and forced vital capacity (FVC) were used to diagnose obstructive and restrictive disorders. An obstructive pattern was defined $FEV_1/FVC <0.70$. A restrictive pattern was defined as $FEV_1/FVC \geq 0.70$ and FVC <80% of the predicted value. Normal lung function was defined as $FEV_1/FVC \geq 0.70$ and FVC $\geq 80\%$ of the predicted value. Participants with obstructive and restrictive patterns were classified as "abnormal."

3. Statistical Analysis

Statistical weights were applied to account for the complex survey design of the Korea National Health and Nutrition Examination Survey, which adopts the proportional distribution method. The prevalence of smoking among adult men (age ≥19 years) who participated in the assessment of smoking characteristics was ascertained. The percentage of current smokers in each smoking cessation stage was calculated. The general characteristics of current smokers before and after the increase in tobacco prices were compared. Continuous variables were analyzed using the t-test, and presented as means and standard errors. Categorical variables were analyzed using the chi-square test, and presented as estimated percentages and standard errors. Crude (model 1) and multiple (model 2) logistic regression models were analyzed after adjusting for the following potential confounders: age,[9-11] area of residence, individual income,[10,12] occupation,[13,14] education,[10,12] comorbidity, subjective health status, and stress level. Odds ratios (ORs) were calculated to examine the associations between different factors and changes in the smoking cessation stage (precontemplation versus contemplation or preparation). The number of cigarettes smoked per

day was excluded from the analysis because it was also believed to have been affected by the increase in tobacco prices. All analyses were conducted using IBM SPSS Complex Samples ver. 25.0 (IBM Corp., Armonk, NY, USA). Results were considered statistically significant if the P-value was <0.05. All participants of the Korea National Health and Nutrition Examination Survey provided written informed consent. The Korea National Health and Nutrition Examination Survey can be conducted without the approval of a research ethics committee because it is a public repository survey aiming to enhance public welfare. This survey is conducted by the Korean Ministry of Health and Welfare.

RESULTS

1. Annual Changes in Smoking Cessation Stages

The smoking prevalence had steadily decreased from 2010 but had slightly increased before the 2015 tobacco price policy had come into effect in Korea. When the price of cigarettes was increased in 2015, the smoking rate decreased by 4%. However, the impact of the price increase did not last for a long time, and the smoking rate increased again in 2016. The percentage of smokers who were in the precontemplation stage had steadily decreased from 2012. In 2015, when the tobacco prices increased, the percentage of smokers who were in the precontemplation stage reached the lowest rate of 56.8%. Subsequently, the percentage continued to increase, similar to the aforementioned smoking prevalence. Conversely, the percentage of smokers in the preparation and contemplation stages had steadily increased from 2012. It reached a maximum of 43.2% in 2015, and declined subsequently (Figure 1).

2. General Characteristics of the Participants

The general characteristics of the two groups of smokers (current smokers in 2012 and 2013 before the policy implementation [before-
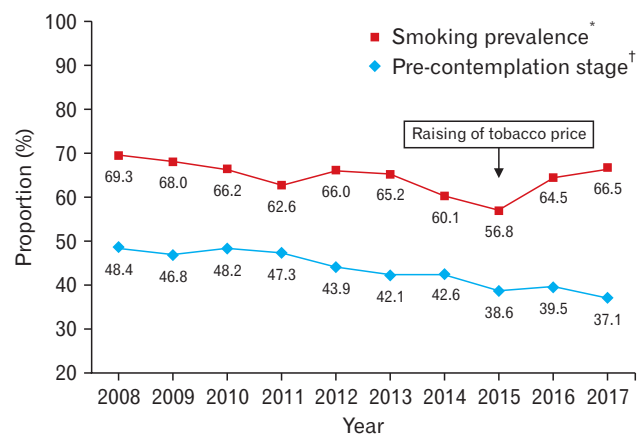
Figure 1. The annual smoking prevalence and percentage of each stages of smoking cessation from 2008 to 2017. *Smoking prevalence were calculated on the male aged 19 and over who responded to smoking questionnaire. †Percentage of each stage of smoking cessation was calculated for current smokers.

Table 1. General characteristics of current smokers before and after the implementation of the tobacco price policy

Characteristic	Before-policy (2012–2013)	After-policy (2015–2016)	P-value
No. of participants	1,778	1,755	
Age (y)	42.0±0.4	42.7±0.4	0.242
Living alone (%)	35.0±1.6	38.6±1.6	0.103
Rural area residence (%)	29.6±2.1	41.9±2.1	<0.001
Lowest quartile of individual income (%)	29.2±1.6	26.8±1.4	0.259
Manual worker or unemployed (%)	54.2±1.8	51.1±2.0	0.277
Education <9 y (%)	9.9±0.8	8.5±0.7	0.212
Smoking amount >1 pack/d (%)	42.5±1.5	34.4±1.4	<0.001
Stage of smoking cessation, precontemplation (%)	65.6±1.4	60.8±1.4	0.014
Heavy drinking (%)	69.6±1.3	71.8±1.3	0.222
One or more comorbidities (%)	30.8±1.8	25.0±1.2	0.007
Poor subjective health status (%)	14.8±1.0	19.1±1.2	0.006
High stress level (%)	26.0±1.2	36.1±1.3	<0.001
Abnormal pulmonary function test (%)	27.8±1.8	29.5±1.8	0.502

Values are presented as number, estimated mean±standard error, or estimated percentage±standard error. P-values are from the chi-square test for categorical variables and from the t-test for continuous variables.

Table 2. Factors associated with remaining in the precontemplation stage among Korean male smokers

Variable	Model 1		Model 2	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age increase by 1 y	1.008 (1.003–1.014)	0.004	1.010 (1.002–1.018)	0.017
Rural area residence	1.110 (0.931–1.322)	0.245	1.180 (0.967–1.441)	0.102
Lowest quartile of individual income	1.181 (0.987–1.414)	0.069	1.226 (1.001–1.502)	0.049
Manual worker or unemployed	1.328 (1.115–1.581)	0.002	1.256 (1.036–1.523)	0.020
Education <9 y	1.076 (0.840–1.380)	0.561	0.828 (0.607–1.131)	0.235
One or more comorbidity	1.017 (0.844–1.225)	0.862	0.848 (0.674–1.067)	0.159
Poor subjective health status	0.973 (0.779–1.216)	0.808	0.995 (0.774–1.278)	0.966
High stress level	0.930 (0.793–1.092)	0.377	0.994 (0.818–1.207)	0.949
After policy	0.812 (0.688–0.959)	0.014	0.832 (0.685–1.011)	0.065

Model 1: crude OR; model 2: adjusted for all covariates in the table (age, area of residence [rural or urban], income [lowest quartile of individual income or higher], occupation [nonmanual worker or manual worker], education [<9 y of education or higher], comorbidity [yes or no], subjective health status [poor or good], stress level [high or low], and participants before and after the increase in tobacco prices).
OR, odds ratio; CI, confidence interval.

policy group]: n=1,778; current smokers in 2015 and 2016 after the policy implementation [after-policy group]: n=1,775) are shown in Table 1. The percentage of participants who were rural residents was higher in the after-policy group (P<0.001). The percentage of participants who consumed more than one pack of cigarettes per day was higher in the before-policy group (P=0.001). The percentage of participants in the precontemplation stage decreased from 65.6% to 60.8% after the policy implementation. Further, the percentage of participants who belonged to the contemplation and preparation stages increased from 34.4% to 39.2% after the policy implementation (P=0.014). The percentage of smokers with one or more chronic diseases (i.e., hypertension, dyslipidemia, diabetes mellitus, angina, myocardial infarction, or stroke) was higher in the before-policy group (P=0.007). The percentage of smokers with poor subjective health (P=0.006) and high levels of stress was higher in the after-policy group (P<0.001) (Table 1).

3. Factors Related to the Effect of Increased Tobacco Prices on Changes in Smoking Cessation Stages

To identify the factors related to the effect of increased tobacco prices on changes in the smoking cessation stages, we conducted logistic regression analysis after adjusting for potential confounders. Model 1 was analyzed using univariate logistic regression analysis. Age (1-year increase) had a negative effect on plans to quit smoking within 6 months (OR, 1.008; 95% confidence interval [CI], 1.03–1.014; P=0.004). Manual workers and unemployed individuals were less likely to consider quitting smoking (OR, 1.328; 95% CI, 1.115–1.581; P=0.002). The increase in tobacco prices resulted in positive changes in smoking cessation stages (OR, 0.812; 95% CI, 0.688–0.959; P=0.014). In model 2, age (1-year increase) (OR, 1.010; 95% CI, 1.002–1.018; P=0.017), individual income (lowest quartile) (OR, 1.226; 95% CI, 1.001–1.502; P=0.049), and occupational status (manual worker or unemployed) (OR, 1.256; 95% CI, 1.036–1.523; P=0.020) were significantly associated with the maintenance of current smoking behaviors after adjusting for multiple confounding variables (i.e., age, area of residence, individual income, occu-

pational status, educational level, comorbidity, subjective health status, stress, and policy implementation). The univariate analysis revealed that the implementation of the tobacco price policy had weak effects on the stages of smoking cessation, and these effects became nonsignificant when all covariates were entered into the model (Table 2).

DISCUSSION

This study was conducted to examine the changes in the stages of smoking cessation among Korean male current smokers before and after the implementation of the tobacco price policy in 2015. We identified related factors that may have contributed to changes in the smoking cessation stages using nationwide data collected as part of the Korea National Health and Nutrition Examination Survey.

During the last 10 years, the prevalence of smoking among Korean adult men (age ≥19 years) has continued to decrease as a result of the implementation of various smoking cessation policies. In 2015, when the tobacco prices were increased, the prevalence of smoking was reported to be <40% for the first time in history of the smoking rate survey. At this time, a noticeable 4% decrease in smoking rate was observed, which was more pronounced than the previously reported average reduction rate (1.5%) (Figure 1). Previous studies have shown that an increase in tobacco prices has a positive effect on the prevalence of smoking.[3,4,15] The Centers for Disease Control and Prevention has estimated that a 10% increase in tobacco prices will reduce the overall tobacco consumption by 3% to 5%.[16] The Korean government had reported that the 80% increase in cigarette prices from 2,500 won to 4,500 won reduced the sale of cigarettes by 15.5% in 2015. By comparing the number of cigarettes consumed per day before and after the implementation of the tobacco price policy, we were also able to demonstrate that the percentage of smokers who smoked more than one pack per day decreased from 42.5% to 34.4%. This suggests that, even if an increase in tobacco prices does not increase quit rates, it has a positive effect on smoking behaviors.

The process of smoking cessation consists of five stages: precontemplation, contemplation, preparation, action, and maintenance. As smokers advance through each stage, their likelihood of quitting smoking within 6 months increases by more than twofold.[7,8] When compared with 2012 and 2013, the percentage of smokers who were in the contemplation and preparation stages in 2015 and 2016 had increased from 34.4% to 39.2%. However, as can be inferred from Figure 1, the percentage of participants in the contemplation and preparation stages had peaked in 2015 but sharply declined and returned to the prior levels thereafter. More than 50% of the current smokers did not plan to quit smoking despite the implementation of the tobacco price policy. The effect of an increase in tobacco prices on the stage of smoking cessation seems to be temporary. The consistently high percentage of participants in the precontemplation stage may be attributable to the decrease in the total number of smokers. The prevalence of smoking has been decreasing during the past 10 years. The total number of smokers, which served as the denominator, had decreased over time

and susceptible smokers had quit smoking. In contrast, the numerator represented the total number of smokers who were unable to quit smoking. Therefore, the percentage of participants in the precontemplation stage may have remained unchanged. Therefore, a tobacco price policy should be designed considering changes in the inflation rate and must be continuously implemented to effectively reduce the prevalence of smoking.

In the present study, age (1-year increase), income (lowest quartile), and occupational status (manual workers and unemployed individuals) were predictors of belonging to the group of smokers in the precontemplation stage (those with no intention to quit smoking).[9,11,17] Jhun and Seo[18] found that smokers with a longer smoking duration are more likely to remain in the precontemplation stage. Researchers have contended that the smoking duration proportionally increases with age. Older smokers may have had several opportunities to quit smoking but have continued to smoke. As smokers grow older, they might have the belief that quitting at their present age would not be substantially beneficial to their health. Our findings suggest the need for efforts to enhance the motivation to quit smoking among older smokers who are unemployed and earning a low income. These results were also consistent with previous findings suggesting that manual workers have high rates of smoking and low rates of quitting.[13,14] Manual workers face lower levels of social pressure and receive lower levels of social support to quit smoking from their job environments when compared with nonmanual workers.[14] Although restrictions on smoking in indoor workplaces have been reinforced in recent times, smoking at outdoor industrial sites is still widely tolerated and considered to provide a short break from work, which could also explain the high smoking rates among manual workers.

Other studies have found that socioeconomic factors affect a person's stage of smoking cessation.[10,12,18] In one study, socioeconomic status and change in the smoking cessation stage were found to be more relevant to male smokers than to female smokers.[18] Another study reported that smokers with a higher educational level and income were more likely to consider quitting smoking within the next 6 months.[12] Most studies have consistently reported similar results.[10,13,18] However, in one study conducted in China, income was not significantly related to smoking cessation.[19] The researchers attributed this finding to the rapid economic growth in China. Specifically, they reported that the rate of increase in household income was more than 3 times greater than that in cigarette consumption.[19] We assumed that smokers whose incomes fall within the lower quartile would have been more likely to have considered quitting smoking after the increase in tobacco prices, owing to the excessive financial burden. However, this group of smokers are also more likely to continue not thinking about quitting smoking because it has been demonstrated that smokers with a lower socioeconomic status are more likely to live in the present and less likely to think about the future.[20] In one study, smoking cessation education through media campaigns was found to be ineffective among socioeconomically disadvantaged smokers.[21] The factors that were found to be associated with remaining in the

precontemplation stage in this study were similar to those that have been identified in previous studies that did not examine the effect of increases in tobacco price. However, we found that, among those who had not changed their minds about smoking cessation, there was no change in the smoking cessation stage despite the increase in cigarette prices. The univariate logistic regression analysis revealed that the increase in cigarette prices had a significant influence on the stage of smoking cessation; however, this effect was not significant in multivariate logistic regression analysis. We speculated that, when compared with an intrinsic motivation to quit smoking, tobacco price increase may have only a limited effect. Moreover, smoking cessation may be influenced by a combination of various socioeconomic and institutional factors.

This study had several limitations. First, because the Korea National Health and Nutrition Examination Survey had adopted a cross-sectional research design, causal relationships could not be examined. Data were collected from different groups of participants in each survey. Nevertheless, we were able to enhance the representativeness of the sample and the accuracy of the data by applying weights to the nationwide sample. Second, smoking duration and nicotine dependence, which are important factors that affect smoking cessation, were not assessed. Further, we could not examine the effects of other tobacco control policies (e.g., expansion of nonsmoking areas, regulations on tobacco advertisements) on smoking cessation. Despite these limitations, this study is the first to examine the changes in smoking cessation stages before and after the implementation of the tobacco price policy among Korean male adult smokers. The study findings offer valuable insights into the effects of the policy implementation, although it was not effective in promoting complete smoking cessation.

In conclusion, the tobacco price policy had some positive impact on the stages of smoking cessation, whereby a transition from "absolutely not thinking of quitting" to "thinking about quitting smoking within the next 6 months" occurred among Korean male adults. However, the effect of the tobacco price policy was not substantial and seemed temporary. Intentions to quit smoking remained unchanged among many participants, who continued to smoke despite the increase in tobacco prices. Therefore, to facilitate a transition from the precontemplation stage to the contemplation or preparation stage among adult smokers, the government should continuously increase tobacco prices to a considerable degree and offer targeted tobacco control interventions to specific demographic groups.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

ORCID

Jihye Kwon: https://orcid.org/0000-0001-7403-6063
Hyunji Kim: https://orcid.org/0000-0003-1965-9406
Hyoeun Kim: https://orcid.org/0000-0001-7078-7599
Sunmi Yoo: https://orcid.org/0000-0001-7407-8423
Seung Guk Park: https://orcid.org/0000-0002-2986-3729

REFERENCES

1. World Health Organization. Tobacco [Internet]. Geneva: World Health Organization; 2019 [cited 2019 Jul 17]. Available from: https://www.who.int/news-room/fact-sheets/detail/tobacco.
2. Jung KJ, Yun YD, Baek SJ, Jee SH, Kim IS. Smoking-attributable mortality among Korean adults, 2012. J Korea Soc Health Inform Stat 2013; 38:36-48.
3. Ross H, Blecher E, Yan L, Hyland A. Do cigarette prices motivate smokers to quit?: new evidence from the ITC survey. Addiction 2011; 106:609-19.
4. Kim DJ, Kim SJ. Impact of increased tobacco price on adult smoking rate in South Korea. Health Policy Manag 2017;27:219-28.
5. DiClemente CC, Prochaska JO, Fairhurst SK, Velicer WF, Velasquez MM, Rossi JS. The process of smoking cessation: an analysis of precontemplation, contemplation, and preparation stages of change. J Consult Clin Psychol 1991;59:295-304.
6. Etter JF, Sutton S. Assessing 'stage of change' in current and former smokers. Addiction 2002;97:1171-82.
7. Joly B, Perriot J, d'Athis P, Chazard E, Brousse G, Quantin C. Success rates in smoking cessation: psychological preparation plays a critical role and interacts with other factors such as psychoactive substances. PLoS One 2017;12:e0184800.
8. Prochaska JO, Goldstein MG. Process of smoking cessation: implications for clinicians. Clin Chest Med 1991;12:727-35.
9. Marques-Vidal P, Melich-Cerveira J, Paccaud F, Waeber G, Vollenweider P, Cornuz J. Prevalence and factors associated with difficulty and intention to quit smoking in Switzerland. BMC Public Health 2011; 11:227.
10. Wewers ME, Stillman FA, Hartman AM, Shopland DR. Distribution of daily smokers by stage of change: current population survey results. Prev Med 2003;36:710-20.
11. Velicer WF, Fava JL, Prochaska JO, Abrams DB, Emmons KM, Pierce JP. Distribution of smokers by stage in three representative samples. Prev Med 1995;24:401-11.
12. Leem AY, Han CH, Ahn CM, Lee SH, Kim JY, Chun EM, et al. Factors associated with stage of change in smoker in relation to smoking cessation based on the Korean National Health and Nutrition Examination Survey II-V. PLoS One 2017;12:e0176294.
13. Nelson DE, Emont SL, Brackbill RM, Cameron LL, Peddicord J, Fiore MC. Cigarette smoking prevalence by occupation in the United States: a comparison between 1978 to 1980 and 1987 to 1990. J Occup Med 1994;36:516-25.
14. Sorensen G, Emmons K, Stoddard AM, Linnan L, Avrunin J. Do social influences contribute to occupational differences in quitting smoking and attitudes toward quitting? Am J Health Promot 2002;16:135-41.
15. Chaloupka FJ, Straif K, Leon ME; Working Group, International Agency for Research on Cancer. Effectiveness of tax and price policies in tobacco control. Tob Control 2011;20:235-8.
16. Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion. Economic trends in tobacco [Inter-

net]. Atlanta (GA): Centers for Disease Control and Prevention; 2019 [cited 2020 Jan 2]. Available from: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/economics/econ_facts/index.htm.

17. Kaplan RM, Pierce JP, Gilpin EA, Johnson M, Bal DG. Stages of smoking cessation: the 1990 California Tobacco Survey. Tob Control 1993;2: 139-44.

18. Jhun HJ, Seo HG. The stages of change in smoking cessation in a representative sample of Korean adult smokers. J Korean Med Sci 2006; 21:843-8.

19. Wang Q, Shen JJ, Sotero M, Li CA, Hou Z. Income, occupation and ed-

ucation: are they related to smoking behaviors in China? PLoS One 2018;13:e0192571.

20. Wardle J, Steptoe A. Socioeconomic differences in attitudes and beliefs about healthy lifestyles. J Epidemiol Community Health 2003;57:440-3.

21. Niederdeppe J, Kuang X, Crock B, Skelton A. Media campaigns to promote smoking cessation among socioeconomically disadvantaged populations: what do we know, what do we need to learn, and what should we do now? Soc Sci Med 2008;67:1343-55.