Effects of Disease Detection on Changes in Smoking Behavior

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Purpose: This study was conducted to investigate the effect that detection of chronic disease via health screening programs has on health behaviors, particularly smoking. Materials and Methods: We analyzed national health insurance data from 2007 and 2009. Subjects who were 40 years of age in 2007 and eligible for the life cycle-based national health screening program were included. The total study population comprised 153518 individuals who participated in the screening program in 2007 and follow-up screening in 2009. Multiple logistic regression analyses were conducted by sex, with adjustment for health insurance type, socioeconomic status, body mass index, diabetes, hypertension, hyperlipidemia, and family history of cardiovascular and/or neurovascular disease. Results: Among men with smoking behavior changes, those newly diagnosed with hyperlipidemia were more likely to show a positive health behavior change, such as smoking cessation, and were less likely to have a negative behavior change (e.g., smoking initiation). Additionally, men newly diagnosed with diabetes showed lower rates of negative health behavior changes compared to those without disease. Body mass index (BMI)≥25, compared to BMI<23, showed higher rates of positive health behavior changes and lower rates of negative health behavior changes. Newly diagnosed chronic disease did not influence smoking behavior in women. Conclusion: Smoking behavior changes were only detected in men who participated in health screening programs. In particular, those newly diagnosed with hyperlipidemia were more likely to stop smoking and less likely to start smoking.

Key Words: Smoking, behavior change, life cycle-based, national, screening program

INTRODUCTION

The purposes of health screening programs are to decrease mortality and incidence rates, as well as increase early detection and treatment rates, for target diseases.1
Screening is thus considered to be a form of secondary prevention against disease. Nevertheless, while screening programs are commonly offered as part of preventive health services in many countries, participation rates play a significant role in increasing the benefits thereof.

In Korea, a nationwide health screening program was initiated in 1980, targeting individuals with chronic diseases working for the government or in schools. In 1995, the Ministry of Health and Welfare initiated the General Health Screening Program (GHSP) to include local and corporate subscribers with National Health Insurance (NHI). In 2007, a new life cycle-based national health screening program was implemented to overcome the limitations of the GHSP. This program targeted participants aged 40 and 66 years to capture health transitions in their life cycle: middle age begins around the age of 40 years, at which time the incidence of chronic disease increases; old age begins around 66 years, at which time geriatric approaches to health promotion are needed. In contrast to the GHSP, the life cycle-based national health screening program provides follow-up consultation services after screening to modify participants’ health behaviors. The National Health Insurance Corporation (NHIC) reported that 69.8% of the participants were satisfied with this program, and 65% felt that it was superior to the GHSP. Furthermore, the NHIC stated that participants who completed primary and secondary screening in 2009 and 2011, respectively, were more likely to change their lifestyles (41%) than were those who participated only in primary screening in 2009 (29%).

Kasl and Cobb defined health behaviors as “any activity undertaken by a person who believes himself to be healthy for the purpose of preventing disease or detecting disease in an asymptomatic stage.” To explain health behavior changes, social psychologists in the US introduced the health belief model in the 1950s to evaluate “the widespread failure of people to accept disease preventives or screening tests for the early detection of asymptomatic disease.” Variables affecting health behavior, such as demographic, sociopsychological, and structural variables, were identified. In addition to these variables, several dimensions affecting health behavior changes were established; these included perceived susceptibility, severity, benefits, and barriers. Rosenstock stated that the levels of perceived susceptibility and severity influence an individual’s actions, and perceived benefits help to determine preferred paths of action. Some form of stimulation is needed in the decision-making process: it may be internal, such as symptoms, or external, such as mass media communications, interpersonal interactions, or reminder postcards from health care providers. New detection of diseases via health screening programs could increase one’s perceived susceptibility and severity, and newly diagnosed individuals who participate in a physician consultation program could gain perceived benefits of guided decisions on courses of action.

The effect of disease detection via health screening programs on health behavior changes is an important issue in health care. Regarding smoking behavior, Hsu, et al. discovered a positive effect on smoking behavior with cancer diagnosis. Also, Neutel, et al. reported that newly diagnosed hypertensive patients often quit smoking. Accordingly, the purpose of this study was to investigate the effect that detection of chronic disease via health screening programs has on health behaviors, particularly smoking.

**MATERIALS AND METHODS**

**Subjects**

The baseline age of the study subjects was 40 years in 2007 and 42 years in 2009. A total of 312480 individuals participated in the life cycle-based national health screening program in 2007, and 194238 of these participants completed follow-up screening in 2009. After excluding participants who did not participate in one of the screening sessions, as well as those for whom data for variables were missing and had unclear responses, the final study population was 153518 (77307 men and 76211 women).

The subjects were recruited from the NHIC; all were aged 40 years and were eligible for the life cycle-based national health screening program (e.g., covered by NHI or Medical aid) in 2007. The NHIC and public health centers campaigned (including by mail) to increase the participation rate among the target population. Qualified clinics, hospitals, and public health centers provided the screening service. Targeted individuals were allowed to select a screening center.

**Variables**

Independent variables were divided into two groups: demographic factors [health insurance type (local or corporate), socioeconomic status (average monthly income in quartiles, and Q4 is the highest income), and body mass index (BMI; ≤23, 23 to ≤25, and ≥25)] and health status [family history of cardiovascular (CV) and/or neurovascular (NV) disease (heart disease and stroke; yes/no); status of diabetes, hyper-
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Changes in smoking behavior (positive, none, negative) was used to characterize the dependent variable (Fig. 1). “Positive change” was defined as smoking cessation (smoker in 2007, ex-smoker in 2009). “No change” was defined as no smoking behavior change between 2007 and 2009. “Negative change” was defined as smoking initiation (ex-smoker or non-smoker in 2007, smoker in 2009).

Statistical analysis
Multiple logistic regression analyses were conducted adjusting for health insurance type, socioeconomic status, BMI, diabetes, hypertension, hyperlipidemia, and family history of CV and/or NV disease. This study conducted multiple logistic regression analyses for two groups, current smoker group and ex-smoker or non-smoker group in 2007. We analyzed the current smoker group for smoking cessation and the ex-smoker or non-smoker group for smoking initiation. The analysis was stratified by sex due to differences in smoking characteristics between men and women.17 Statistical analyses were performed using SAS software (version 9.2; SAS Institute Inc., Cary, NC, USA).

RESULTS

Table 1 shows the baseline characteristics of the study population. A total of 153858 individuals (77307 men and 76211 women; 94193 non-smokers, 20403 ex-smokers, 38922 current smokers) participated in screening in 2007. In 2007, 3466 individuals (1443 non-smokers, 611 ex-smokers, 1412 current smokers) were newly diagnosed with diabetes; 9823 (4388 non-smokers, 1944 ex-smokers, 3491 current smokers) were newly diagnosed with hypertension; and 22023 (8863 non-smokers, 4059 ex-smokers, 9101 current smokers) were newly diagnosed with hyperlipidemia.

Changes in smoking behavior during the study period are described in Table 2. Most (97.6%) individuals who were non-smokers in 2007 remained ex-smokers or non-smokers in 2009; 2.4% were current smokers in 2009. Most (83.8%) individuals who were ex-smokers in 2007 retained this status, although 16.2% were current smokers in 2009. Similarly, most (87.0%) individuals who were current smokers in 2007 continued to smoke, although 13.0% were ex-smokers or non-smokers in 2009.

Table 3 and 4 show the results of the multiple logistic regression analyses of changes in smoking behavior. Table 3 lists the results of a positive change in smoking behavior among current smokers in 2007. The analysis revealed no significant relationship among women. In men, the risk of smoking cessation was 1.11 [95% confidence interval (CI), 1.03–1.20] times higher for men newly diagnosed with hyperlipidemia in 2007 than among those who had never had hyperlipidemia. Smoking cessation was 1.33 (95% CI, 1.05–1.68) times higher for men who had known diabetes in 2007 than among those who had never had diabetes. The risk of smoking cessation was 1.06 (95% CI, 0.95–1.19) times higher for men newly diagnosed with hypertension in 2007 than among those who had never had hypertension, al-
though the result was not statistically significant. The risk of smoking cessation was 1.17 (95% CI, 1.01–1.35) times higher among men with BMI≥25, compared to men with BMI<23. Table 4 shows the results of a negative change in smoking behavior among ex-smokers or non-smokers in 2007. Among men, the risk of smoking initiation was 0.75 (95% CI, 0.64–0.88) times and 0.79 (95% CI, 0.73–0.85) times lower for those newly diagnosed with diabetes or hyperlipidemia in 2007 than among those who had never had diabetes or hyperlipidemia, respectively. The risk of smoking initiation was 0.62 (95% CI, 0.55–0.69) times lower among men with BMI≥25, compared to men with BMI<23. There were no significant results in women.

In this study, the probability of smoking cessation among current smokers was higher among men with newly diagnosed hyperlipidemia and smoking initiation among ex-smoker or non-smoker was lower among men with newly diagnosed diabetes or hyperlipidemia, compared to those without disease, respectively. Meanwhile, studies have mentioned that hyperlipidemia patients are more likely to not know of their disease before being diagnosed by a doctor, compared to those with though the result was not statistically significant. The risk of smoking cessation was 1.17 (95% CI, 1.01–1.35) times higher among men with BMI≥25, compared to men with BMI<23. Table 4 shows the results of a negative change in smoking behavior among ex-smokers or non-smokers in 2007. Among men, the risk of smoking initiation was 0.75 (95% CI, 0.64–0.88) times and 0.79 (95% CI, 0.73–0.85) times lower for those newly diagnosed with diabetes or hyperlipidemia in 2007 than among those who had never had diabetes or hyperlipidemia, respectively. The risk of smoking initiation was 0.62 (95% CI, 0.55–0.69) times lower among men with BMI≥25, compared to men with BMI<23. There were no significant results in women.

In this study, to investigate the relationship between disease detection by screening programs and changes in smoking behavior, changes among women and men were analyzed with adjustment for health insurance type, socioeconomic status, BMI, diabetes, hypertension, hyperlipidemia, and family history of CV and/or NV disease.

In this study, the probability of smoking cessation among current smokers was higher among men with newly diagnosed hyperlipidemia and smoking initiation among ex-smoker or non-smoker was lower among men with newly diagnosed diabetes or hyperlipidemia, compared to those without disease, respectively. Meanwhile, studies have mentioned that hyperlipidemia patients are more likely to not know of their disease before being diagnosed by a doctor, compared to those without disease. The risk of smoking cessation was 1.17 (95% CI, 1.01–1.35) times higher among men with BMI≥25, compared to men with BMI<23. Table 4 shows the results of a negative change in smoking behavior among ex-smokers or non-smokers in 2007. Among men, the risk of smoking initiation was 0.75 (95% CI, 0.64–0.88) times and 0.79 (95% CI, 0.73–0.85) times lower for those newly diagnosed with diabetes or hyperlipidemia in 2007 than among those who had never had diabetes or hyperlipidemia, respectively. The risk of smoking initiation was 0.62 (95% CI, 0.55–0.69) times lower among men with BMI≥25, compared to men with BMI<23. There were no significant results in women.

Table 1. Characteristics of Subjects at Baseline (2007)

| Variables                                | Total, n (%) | Non-smoker, n (%) | Ex-smoker, n (%) | Current smoker, n (%) | p value |
|-------------------------------------------|--------------|-------------------|------------------|-----------------------|---------|
| Total                                     | 153518 (100.0) | 94193 (61.4) | 20403 (13.3) | 38922 (25.4) |         |
| Sex                                       |              |                   |                   |                       | <0.0001 |
| Men                                       | 77307 (50.4) | 20116 (26.0) | 19691 (25.5) | 37500 (48.5) |         |
| Women                                     | 76211 (49.6) | 74077 (97.2) | 712 (0.9)     | 1422 (1.9)   |         |
| Health insurance type                     |              |                   |                   |                       |         |
| Local                                     | 33871 (22.1) | 24440 (72.2) | 3242 (9.6)   | 6189 (18.3)  |         |
| Corporate                                 | 119647 (77.9)| 69753 (58.3) | 17161 (14.3) | 32733 (27.4) |         |
| Socioeconomic status                      |              |                   |                   |                       | <0.0001 |
| Q1                                        | 38364 (25.0) | 27949 (72.9) | 3054 (8.0)   | 7361 (19.2)  |         |
| Q2                                        | 38393 (25.0) | 22086 (57.5) | 4691 (12.9)  | 11346 (29.6) |         |
| Q3                                        | 38370 (25.0) | 21187 (55.2) | 6124 (16.0)  | 11059 (28.8) |         |
| Q4                                        | 38391 (25.0) | 22971 (59.8) | 6264 (16.3)  | 9156 (23.9)  |         |
| Body mass index                           |              |                   |                   |                       | <0.0001 |
| <23                                       | 107808 (70.2)| 72433 (67.2) | 11589 (10.8) | 23786 (22.1) |         |
| 23≤ and <25                               | 39489 (25.7)| 18938 (48.0) | 7502 (19.0)  | 13049 (33.0) |         |
| 25≤                                       | 6221 (4.1)   | 2822 (45.4) | 1312 (21.1)  | 2087 (33.6)  |         |
| Diabetes                                  |              |                   |                   |                       | <0.0001 |
| No diabetes                               | 147504 (96.1)| 91478 (62.0) | 19361 (13.1) | 36665 (24.9) |         |
| Known diabetes                            | 2548 (1.7)   | 1272 (49.9) | 431 (16.9)   | 845 (33.2)   |         |
| Newly diagnosed                           | 3466 (2.3)   | 1443 (41.6) | 611 (17.6)   | 1412 (40.7)  |         |
| Hypertension                              |              |                   |                   |                       | <0.0001 |
| No hypertension                           | 138067 (89.9)| 87044 (63.0) | 17277 (12.5) | 33746 (24.4) |         |
| Known hypertension                        | 5628 (3.7)   | 2761 (49.1) | 1182 (21.0)  | 1685 (29.9)  |         |
| Newly diagnosed                           | 9823 (6.4)   | 4388 (44.7) | 1944 (19.8)  | 3491 (35.5)  |         |
| Hyperlipidemia                            |              |                   |                   |                       | <0.0001 |
| No hyperlipidemia                         | 128088 (83.4)| 84022 (65.6) | 15526 (12.1) | 28540 (22.3) |         |
| Known hyperlipidemia                      | 3407 (2.2)   | 1308 (38.4) | 818 (24.0)   | 1281 (37.6)  |         |
| Newly diagnosed                           | 22023 (14.4)| 8863 (40.2) | 4059 (18.4)  | 9101 (41.3)  |         |
| Family history of cardiovascular/neurovascular disease |              |                   |                   |                       | <0.0001 |
| No                                        | 130643 (85.1)| 80121 (61.3) | 17145 (13.1) | 33377 (25.6) |         |
| Yes                                       | 22875 (14.9)| 14072 (61.5) | 3258 (14.2)  | 5545 (24.2)  |         |
In the present study, the number of people who were newly diagnosed with hyperlipidemia was greater than those newly diagnosed with diabetes or hypertension. Among 153,518 individuals, 22,023 (14.4%) were newly diagnosed with hyperlipidemia, while only 3,466 (2.3%) and 9,823 (6.4%) were newly diagnosed with diabetes or hypertension.

Table 2. Changes in Smoking Behavior during the Study Period

| Category            | 2007 n=153518 (%) | 2009  |
|---------------------|-------------------|-------|
|                     | No (non-smoker & ex-smoker) n=77307 (%) | Yes (current smoker) n=76211 (%) |
| Non-smoker          |                   |       |
| Total               | 94,193 (100.0)    | 91,964 (97.6) | 22,299 (2.4) |
| Men                 | 20,116 (21.4)     | 18,207 (90.5) | 1,909 (9.5)  |
| Women               | 74,077 (78.6)     | 73,757 (99.6) | 320 (0.4)    |
| Ex-smoker           |                   |       |
| Total               | 20,403 (100.0)    | 17,106 (83.8) | 3,297 (16.2) |
| Men                 | 19,691 (96.5)     | 16,550 (84.1) | 3,141 (16.0) |
| Women               | 712 (3.5)         | 556 (78.1)   | 156 (21.9)   |
| Current smoker      |                   |       |
| Total               | 38,922 (100.0)    | 50,633 (13.0) | 33,859 (87.0) |
| Men                 | 37,500 (96.3)     | 48,022 (12.8) | 32,698 (87.2) |
| Women               | 1,422 (3.7)       | 2,611 (18.4)  | 1,161 (81.7) |

Table 3. Risk of Positive Change in Smoking Behavior for Current Smokers in 2007*

| Variable                                      | Men OR 95% CI p for trend | Women OR 95% CI p for trend |
|-----------------------------------------------|----------------------------|-----------------------------|
| Health insurance type                         |                            |                             |
| Local                                         | 1.00 (0.92–1.09) 0.950 p  | 1.00 (0.55–0.95) 0.019 p    |
| Corporate                                     | 1.00 (0.92–1.09) 0.72 p   |                             |
| Socioeconomic status                          |                            |                             |
| Q1                                             | 1.00 (0.91–1.11) 0.389 p  | 1.24 (0.88–1.74) 0.320 p   |
| Q2                                             | 1.00 (0.91–1.11) 0.389 p  | 1.24 (0.88–1.74) 0.320 p   |
| Q3                                             | 0.83 (0.75–0.91) 0.85 p   | 0.92 (0.62–1.37)           |
| Q4                                             | 0.71 (0.64–0.78) 0.85 p   | 0.92 (0.62–1.37)           |
| Body mass index                                |                            |                             |
| <23                                            | 1.00 (1.00–1.00) 1.00 p   | 1.00 (1.00–1.00) 1.00 p    |
| 23≤ and <25                                    | 0.93 (0.87–0.99) 0.906 p  | 1.07 (0.72–1.58) 0.681 p   |
| 25≤                                            | 1.17 (1.01–1.35) 1.13 p   | 0.92 (0.62–1.37)           |
| Diabetes                                       |                            |                             |
| No diabetes                                    | 1.00 (1.00–1.00) 1.00 p   | 1.00 (1.00–1.00) 1.00 p    |
| Known diabetes                                 | 1.33 (1.05–1.68) 0.114 p  | 0.97 (0.38–2.47) 0.554 p   |
| Newly diagnosed                                | 1.08 (0.91–1.27) 1.77 p   | 0.97 (0.38–2.47) 0.554 p   |
| Hypertension                                   |                            |                             |
| No hypertension                                | 1.00 (1.00–1.00) 1.00 p   | 1.00 (1.00–1.00) 1.00 p    |
| Known hypertension                             | 1.01 (0.86–1.18) 0.288 p  | 1.84 (0.73–4.64) 0.303 p   |
| Newly diagnosed                                | 1.06 (0.95–1.19) 0.56 p   | 0.56 (0.29–1.09)           |
| Hyperlipidemia                                 |                            |                             |
| No hyperlipidemia                              | 1.00 (1.00–1.00) 1.00 p   | 1.00 (1.00–1.00) 1.00 p    |
| Known hyperlipidemia                           | 0.96 (0.81–1.14) 1.091 p  | 0.52 (0.15–1.75) 0.253 p   |
| Newly diagnosed                                | 1.11 (1.03–1.20) 1.40 p   | 0.84 (0.42–2.33)           |
| Family history of cardiovascular/neurovascular disease | | |
| No                                             | 1.00 (1.00–1.00) 1.00 p   | 1.00 (1.00–1.00) 1.00 p    |
| Yes                                            | 0.97 (0.89–1.06) 0.556 p  | 0.82 (0.59–1.14) 0.243 p   |

OR, odds ratio; CI, confidence interval.

*Positive change: change to ex-smoker in 2009 among current smokers in 2007.
According to the OECD Factbook 2011‒2012: Economic, Environmental and Social Statistics, the difference in smoking rates between men and women was larger in Korea than in other OECD countries. The sex-based difference in smoking behavior for Korea is related to many variables, including gender roles, social norms, and other cultural and economic factors. For instance, marriage status affects this difference in Asian, but not European, countries. In addition, cigarette use is acceptable under cultural norms for men in social and business settings. However, in women, smoking is considered to be against cultural norms.

Previously, according to a trans-theoretical model, Audrain, et al. noted gender differences in smoking behavior changes: gender differences were discovered for several stages of smoking behavior change, such as ready to quit smoking, perceived benefits and cost of smoking, and self-efficacy. For these reasons, our analysis of changes in smoking behavior was stratified by sex.

In 2010, smoking rates among men and women in Korea were 48.3% and 6.3%, respectively.19 According to the Organization for Economic Co-operation and Development (OECD), the average smoking rates among men and women were 27.5% and 17.5%, respectively, in 2011.22 According to the OECD Factbook 2011‒2012: Economic, Environmental and Social Statistics, the difference in smoking rates between men and women was larger in Korea than in other OECD countries. The sex-based difference in smoking behavior for Korea is related to many variables, including gender roles, social norms, and other cultural and economic factors. For instance, marriage status affects this difference in Asian, but not European, countries. In addition, cigarette use is acceptable under cultural norms for men in social and business settings. However, in women, smoking is considered to be against cultural norms. In their study, among individuals who successfully quit smoking, 72.4% had a BMI≥23.

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This study has several limitations. A lot of data were missing from responses, which may have impacted the statistical power of the analysis. In addition, the multiple logistic regression analysis did not allow for the determination of causal relationships. Furthermore, we had no information about the number of cigarettes smoked, smoking duration, or experiences with smoking cessation attempts. Despite these limitations, this study is the first to focus on behavioral changes induced by the life cycle-based national health screening program in Korea. Future studies should be conducted using advanced statistical methods and data obtained with high response rates, as well as adjustment for additional smoking-related variables.

In conclusion, smoking behavior changes after participation in a health screening program were detected only in Korean men. In particular, among men newly diagnosed with hyperlipidemia, current smokers were more likely to stop smoking, while non-smokers or ex-smokers were less likely to start smoking.

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REFERENCES

1. Lee WC, Lee SY. National Health Screening Program of Korea. J Korean Med Assoc 2010;53:363-70.
2. Kim HS, Shin DW, Lee WC, Kim YT, Cho B. National screening program for transitional ages in Korea: a new screening for strengthening primary prevention and follow-up care. J Korean Med Sci 2012;27 Suppl:S70-5.
3. UK National Screening Committee. Screening programmes across the UK. [accessed on 2013 October 10]. Available at: http://www.screening.nhs.uk/programmes.
4. Kim YT, Lee WC, Cho B. National screening program for the transitional ages in Korea. J Korean Med Assoc 2010;53:371-6.
5. Park IB, Baik SH. Epidemiologic characteristics of diabetes mellitus in Korea: current status of diabetic patients using Korean Health Insurance Database. Korean Diabetes J 2009;33:357-62.
6. Roh Y, Cho K. Age grouping patterns in the geriatrics journal 1990-1994 and policy development. Korean J Fam Med 1996;17:554-69.
7. Lee AK, Ko MJ, Han JT, Oh SW, Seo S. The study for National Screening Program for Transitional Ages. Seoul: National Health Insurance Corporation; 2008.
8. The analysis of effectiveness of National Screening Program for Transitional Ages in 2007. Seoul: National Health Insurance Corporation; 2010.
9. Rosenstock IM. The health belief model and preventive health behavior. Health Educ Behav 1974;2:354-86.
10. Kasl SV, Cobb S. Health behavior, illness behavior, and sick role behavior. I. Health and illness behavior. Arch Environ Health 1966;12:246-66.
11. Janz NK, Becker MH. The Health Belief Model: a decade later. Health Educ Q 1984;11:1-47.
12. DiClemente RJ, Peterson JL. Preventing AIDS: theories and methods of behavioral interventions. 2nd ed. New York: Springer; 1994.
13. Rosenstock IM. Historical origins of the health belief model. Health Educ Behav 1974;2:328-35.
14. Park JJ, Park HA. Prevalence of cigarette smoking among adult cancer survivors in Korea. Yonsei Med J 2015;56:556-62.
15. Hsu CC, Kwan GN, Chawla A, Mitina N, Christie D. Smoking habits of radiotherapy patients: did the diagnosis of cancer make an impact and is there an opportunity to intervene? J Med Imaging Radiat Oncol 2011;55:526-31.
16. Neutel CI, Campbell N; Canadian Hypertension Society. Changes in lifestyle after hypertension diagnosis in Canada. Can J Cardiol 2008;24:199-204.
17. Cho HJ, Khang YH, Jun HJ, Kawachi I. Marital status and smoking in Korea: the influence of gender and age. Soc Sci Med 2008;66:609-19.
18. Gnasso A, Calindro MC, Carallo C, De Novara G, Ferraro M, Gorgone G, et al. Awareness, treatment and control of hyperlipidaemia, hypertension and diabetes mellitus in a selected population of southern Italy. Eur J Epidemiol 1997;13:421-8.
19. Omboni S, Carabelli G, Ghirardi E, Carugo S. Awareness, treatment, and control of major cardiovascular risk factors in a small-scale Italian community: results of a screening campaign. Vasc Health Risk Manag 2013;9:177-85.
20. Lee KJ, Chang CJ, Kim MS, Lee MH, Cho YH. [Factors associated with success of smoking cessation during 6 months]. Taehan Kanho Hakhoe Chi 2006;36:742-50.
21. Korea Centers for Disease Control and Prevention. Korea National Health and Nutrition Examination Survey (KNHANES) 2010. [accessed on 2013 October 10]. Available at: http://knhanes.cdc.go.kr/knhanes/index.do.
22. Organisation for Economic Co-operation and Development (OECD), OECD Factbook 2011-2012: Economic, Environmental and Social Statistics 2012. [accessed on 2013 October 10]. Available at: http://www.oecd.org/.
23. Hitchman SC, Fong GT. Gender empowerment and female-to-male smoking prevalence ratios. Bull World Health Organ 2011;89:195-202.
24. French DJ, Jang SN, Tait RJ, Anstey KJ. Cross-national gender differences in the socioeconomic factors associated with smoking in Australia, the United States of America and South Korea. Int J Public Health 2013;58:345-53.
25. Audrain J, Gomez-Camino A, Robertson AR, Boyd R, Orleans CT, Lerman C. Gender and ethnic differences in readiness to change smoking behavior. Womens Health 1997;3:139-50.