RESEARCH ARTICLE

Effect on Smoking Quit Rate of Telling Smokers their Health Risk Appraisal in Terms of Health Age: A Randomized Control Trial

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Abstract

Background: We evaluated whether providing health risk appraisal for Koreans (KHRA) in terms of 'health age' during smoking cessation program would effectively help smokers quit smoking or not. Materials and Methods: A total of 332 male smokers aged between 30-65 years old, registered for a smoking cessation program in a public health center in a city, were recruited and underwent a baseline survey from January 2010 to February 2011. They were then prospectively randomized to a conventional counseling group (n=165) or a KHRA group (n=167), and received conventional counseling or KHRA-based counseling for six months. Abstinence rates were identified through carbon monoxide measurement (at the 4th and 24th weeks) or urinary cotinine level (at the 12th week). Results: The abstinence rate confirmed by exhaled carbon monoxide was significantly higher in the KHRA group (61.1%) than the control group (49.1%) at the 4th week (absolute difference 12.0%, 95% CI: 1.4%-22.6%). However, there was no difference in abstinence rates between the two groups at the 12th and 24th weeks. The predicting factors of 24 week's smoking cessation success were age, older than 50 years old (OR 2.02, 95% CI: 1.16-3.52), lower Fagerström Test for Nicotine Dependence score less than 4 (OR 1.84, 95% CI: 1.03-3.29), and higher Self Efficacy/Temptation score (OR 1.79, 95% CI: 1.05-3.06). Conclusions: Smoking cessation counseling with KHRA could be effective compared to conventional counseling in the short period of smoking cessation. Further study is needed to evaluate the long-term efficacy of KHRA in tobacco dependence treatment and to establish the indication and target population of this tool.

Keywords: Cessation - nicotine dependence - health risk appraisal - counseling

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Introduction

Tobacco-related diseases and deaths are preventive. Furthermore, early quit smoking results in longer life compared to continued smoking (Karimy et al., 2013). If a smoker quit in his/her 30s', the life expectancy would be the same as those who have never smoked. If smokers quit in their 40s', 50s' or 60s', the smokers could live nine years more, six years more, or three years more, respectively (Doll et al., 1994). Therefore, developing effective smoking cessation programs is important to prevent the public from tobacco-related diseases and premature deaths (Jayakrishnan et al., 2013; Lin et al., 2013).

In Korea, the first smoking cessation program that the government carried out began in 2004 within 10 regional health centers and the program expanded nationwide in 2005. The Korean smoking prevention program provides six months (eight times) counseling by trained smoking cessation professionals to registered smokers and if needed, nicotine replacement therapy(NRT) is additionally provided for six weeks (Oh et al., 2013). The nationwide smoking cessation programs and other tobacco control policies in Korea have achieved rapid decrease of male smoking prevalence from almost 80%, the world highest rate in 1980s, to 47.3% in 2011 from the Korea National Health and Nutritional Survey. Since 2006, however, the downward trend of smoking prevalence became slow and in 2010 the prevalence re-increased among the younger generation. In turn, the efforts to improve the likelihood of smokers quitting smoking are most needed.

As a new approach, Parkes et al. (2008) adopted health risk appraisal (HRA) in terms of 'lung age' in order to improve smoking quit rate. The HRA with the concept of "lung age" was a psychological tool to show smokers the apparent premature ageing of their lungs. As an intervention, smokers were shown the change of lung

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function between continued smoking and quit smoking. As a result, 12 months later, 13.6% of smokers in the case group successfully quitted smoking, while only 6.4% of smokers in the controlled group quitted smoking.

My Health Age is the Korean HRA (KHRA) and was developed by the Korean Academy of Family Medicine (see Methods section for the detailed introduction of KHRA) We adopted My Health Age to the smoking cessation programs and assessed how it effectively helped to quit smoking.

Materials and Methods

Setting and participants

In order to participate in the study, smokers had to meet the following criteria: smoking at least 10 cigarettes per day during past month; no current use of antidepressants, antipsychotics, or benzodiazepines; not currently taking psychiatric consult for depression, anxiety, or panic disorder; no heavy alcohol or substance abuse; and no serious medical condition. Male smokers aged 30-65 years old, who had registered in the smoking cessation program of Public Health Center in Anyang City from January 2010 to February 2011 were recruited in this study. After excluding 187 smokers who had refused to participate in the study, 332 male smokers were randomly assigned to either the control or intervention group (Control: 165, Case: 167) (Figure 1). Randomization was conducted using permuted block randomization (block size = 3) to obtain balance between groups.

Estimation of sample size

Given the result of existing research with similar kind of study design (Parkes et al., 2008) the sample size was calculated to show the difference of quit rate of 15% at Week 24 follow-up between groups. Aiming for statistical power of 80% with alpha set at 0.05 and assuming a dropout rate of 10%, the required number of participants in each group was 160.

Instruments and measurements

For psychometric tools, we employed Fagerström Test for Nicotine Dependence (FTND), Kano Test for Social Nicotine Dependence (KTSND), Minnesota Nicotine Withdrawal Scale (MNWS), Self-Efficacy/Temptation, Kim's Smoking Cessation Motivation Scale (KSCMS), Center for Epidemiological Studies-Depression Scale (CES-D), and Global Assessment of Recent Stress (GARS).

In order to examine a successful quitting we interviewed the participants, and measured exhaled CO during their visits in week 4, 12 and 24. Self-reported abstinence rate was estimated by 7-day point prevalence at their visits. To measure exhaled CO of the participants, Micro Medical Baby CO monitor (International Direct, UK) was used. And urine cotinine level was also evaluated during their visit at 12th week. NicCheckTM I was used to measure urine cotinine level (Mossman Associates Inc., USA). Urine cotitine was measured after identification of self-purchase of nicotine products by study subjects to exclude the effect of nicotine patch or gum.

The Korean Health Risk Appraisal (KHRA), My Health Age, was developed by the concept based on the Framingham Heart Score and Robbins' method of 'Prospective Medicine' (Sadusk Jr et al., 1968; Robbins et al., 1970; Robbins et al., 1982; Fletcher et al., 1986; Alexander, 2003). The principle of 'Prospective Medicine' is that every individual is faced with certain health risks as a member of constituted group; and further that these average risks may be adjusted to the individual if we know the subject's prognostic characteristics and mortality data of cohorts with similar prognostic characteristics. The KHRA provides death possibility within 10 years and probability distribution of potential development of particular diseases (mainly cardiovascular diseases or lung cancer) after personal health risk factors were entered in the program. In addition, when a risk factor is deleted, the adjusted data are provided. The KHRA is publicly available as a free in the website of Korean Academy of

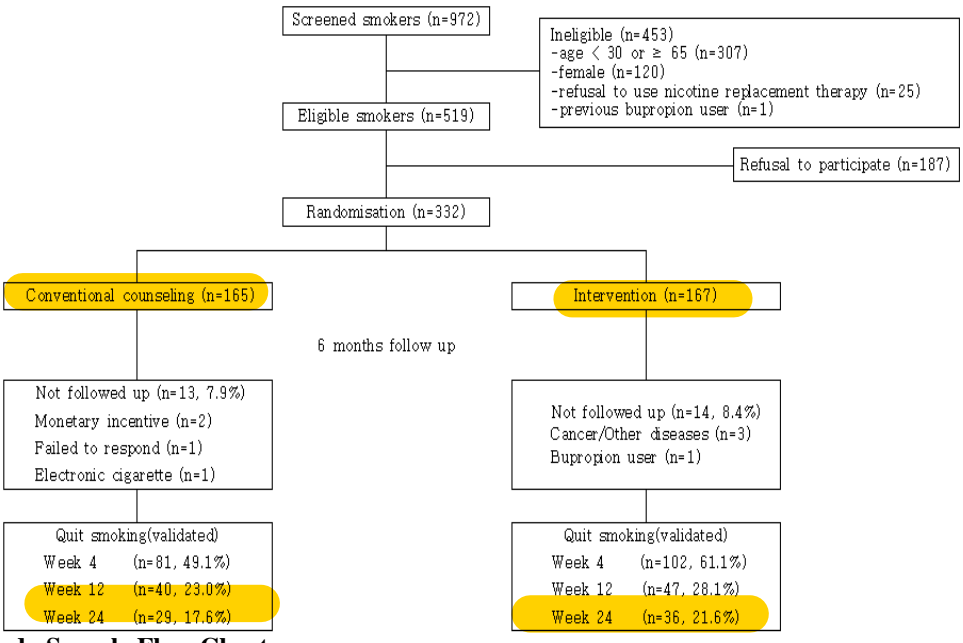

Figure 1. Study Sample Flow Chart

Family Medicine. This tool was validated by the studies using the data of morbidity and mortality of the National Health Insurance Corporation (Kim, 2004; Park, 2007). Correlation coefficients between predictive mortality and observed mortality were 0.875. The KHRA consists of 80 questions, including 6 questions about life style, 11 questions about health history, 8 questions about family history, 3 questions about each tobacco use and alcohol use, and 9 questions about diet and physical activity.

Interventions

The control group received conventional counseling that the smoking cessation guideline suggested, while the intervention group was provided KHRA during their visits in the second week and sixth week. We evaluated the difference of smoking quit rates between the case and control groups in the 4th weeks, 12th weeks and 24th weeks. The participants from the both groups had to visit the smoking cessation center in 2, 4, 6, 8, 12, 16, 20, and 24 weeks after the first visit for registration in the program. During the first visit, all participants were asked to complete a self-administrated questionnaire on socio-demographic information, alcohol use, physical activity, medical history, tobacco use, nicotine dependence, quit attempt, stress, depression, etc., and to be measured exhaled CO. Nicotine patch or gum was freely offered to both groups equally up to 6 weeks unless they did not agree with NRT. On the second visit, all participants began to quit smoking.

A smoking cessation counselor who was solely devoted to consultation with KHRA was trained to give the participants assigned to the intervention group a standardized protocol of KHRA counseling. About 5 minutes explanation with KHRA was provided to motivate the intervention group at second and sixth week. The age difference between their estimated health age and real chronological age was emphasized using pictograms provided by the KHRA tool (Figure 2). The portion of age difference impacted by smoking behavior was intensively explained to promote the smoker's motivation to quit. Also age benefit by smoking cessation was presented by re-calculating their Health Age using KHRA tool.

Figure 2. An Example of Korean Health Risk Appraisal Tool (My Health Age)

Table 1. Baseline Characteristics of Study Groups

Factors	Control group (n=165) Mean±S.D. or No. (%)	Intervention group (n=167) Mean±S.D. or No. (%)
Age (year)	45.3±8.7	45.6±8.5
Height (cm)	171.8±5.8	172.4±4.8
Weight (kg)	72.3±9.7	71.2±11.1
Systolic Blood Pressure (mmHg)	120.6±12.0	121.8±14.8
Diastolic Blood Pressure (mmHg)	79.1±5.6	80.7±5.5
Alcohol use*	2.1±1.2	2.2±1.3
Exercise*	3.1±1.6	3.0±1.6
Number of years smoked (year)	26.5±7.8	26.8±8.7
Daily cigarette consumption (ea)	20.6±7.1	22.5±8.8
Education level		
High school	55 (35.0)	44 (27.3)
Technical college	22 (14.0)	23 (14.3)
University or more	80 (51.0)	94 (58.4)
Monthly income		
Low (US$2,000 or less)	29 (24.6)	20 (16.9)
Middle (US$2,010-4,990)	66 (55.9)	64 (54.2)
High (US$5,000 or more)	23 (19.5)	34 (28.8)
Medication history		
Yes	36 (21.8)	34 (20.4)
No	129 (78.2)	133 (79.6)
Previous quit attempt		
Yes	67 (43.8)	63 (39.4)
No	86 (56.2)	97 (60.6)
FTND	4.6±2.3	5.0±2.4
CES-D	12.5±9.4	12.6±9.1
GARS	25.2±12.4	25.4±11.8
KTSND	14.0±4.9	14.0±5.5
KSCMS	38.9±6.9	39.8±6.5
SET	25.4±6.9	25.6±6.5
MNWS	9.2±5.3	9.5±5.6

*Numbers of drinking alcohol and doing exercise within a week; **US$1=1000 won; FTND: Fagerström Test for Nicotine Dependence; CES-D: Center for Epidemiological Studies-Depression Scale; GARS: Global Assessment of Recent Stress; KTSND: Kano Test for Social Nicotine Dependence; KSCMS: Kim's Smoking Cessation Motivation Scale; SET: Smoking: Self-Efficacy/Temptation; MNWS: Minnesota Nicotine Withdrawal Scale; ***S.D=Standard Deviation: The total number of participants in each characteristic may be less than 332 due to missing values

Data analysis

Analysis of the data was completed using the Statistical Package for the Social Sciences (SPSS, Chicago, IL, USA). T-test and Chi-squared test were used to analyze the differences of quit smoking rate in the control and case groups. Multivariate logistic regression was used to identify the predicting factors which influence successful quit smoking. The significance level of statistical analysis was 0.05.

Ethical consideration

This study was executed in compliance with the Declaration of Helsinki and approved by the institutional review boards of Hallym University Sacred Heart Hospital, Hallym Universtiy Medical Center.

Results

Table 1 shows the baseline characteristics of the intervention and control groups. There were no differences in age, height and weight. Alcohol use and exercise in the both groups were also similar. In addition, the both group have smoked in average more than 28 years. However, participants in the intervention group smoke more cigarettes per day with 22.5 (±8.8) cigarettes compared to 20.6 (±7.1) cigarettes. Educational level, monthly income, medical history and previous quit attempt were not

Table 2. Comparison of Smoking Cessation Rates between the Intervention and Control Groups (Intention to treat analysis*)

Time of follow-up	Smoking cessation rates (%)		Difference (%)	95% CI
	Control group	Intervention group		
4-week follow-up				
Self-reported rate	67.9	77.8	9.9	0.5-19.5
Validated rate**	49.1	61.1	12.0	1.4-22.6
12-week follow-up				
Self-reported rate	51.5	58.1	6.6	-4.1-17.3
Validated rate**	23.0	28.1	5.1	-4.3-14.5
24-week follow-up				
Self-reported rate	44.2	47.9	5.7	-7.1-14.4
Validated rate**	17.6	21.6	4.0	-4.5-12.5

*Analysis involving the participants who were both available and lost at follow-up; **Validated by exhaled CO measurement (at week 4, and 24) and urinary cotinine (at week 12); The average number of cigarettes smoked per day was controlled due to the mean difference between two groups; Self-reported abstinence rate was based on the 7-day point prevalence

Table 3. Predicting Factors of Successful Quitting (Validated data)

Factors	Week 4 OR (95% CI)	Week 12 OR (95% CI)	Week 24 OR (95% CI)
Age (year)			
30-39	Ref	Ref	Ref
40-49	1.38 (0.78-2.44)	1.30 (0.76-2.23)	1.26 (0.73-2.18)
≥50	3.20 (1.66-6.15)	2.72 (1.54-4.79)	2.02 (1.16-3.52)
Education level			
High school or less	Ref	Ref	Ref
Technical college	0.47 (0.21-1.06)	0.58 (0.28-1.18)	0.87 (0.43-1.76)
University or more	0.47 (0.26-0.87)	0.72 (0.44-1.19)	0.96 (0.58-1.57)
FTND (score)			
7-10	Ref	Ref	Ref
4-6	1.31 (0.72-2.35)	1.88 (1.09-3.24)	1.39 (0.80-2.41)
1-3	1.46 (0.77-2.76)	1.84 (1.03-3.29)	1.84 (1.03-3.29)
KSCMS (score)			
Low	Ref	Ref	Ref
Middle	2.18 (1.16-4.09)	2.04 (1.15-3.63)	1.78 (1.00-3.18)
High	1.74 (0.97-3.13)	1.44 (0.83-2.50)	1.67 (0.95-2.92)
SET (score)			
Low	Ref	Ref	Ref
Middle	3.07 (1.60-5.91)	1.65 (0.94-2.91)	1.44 (0.81-2.54)
High	3.04 (1.66-5.55)	1.89(1.10-3.22)	1.79 (1.05-3.06)
KTSND (score)			
High	Ref	Ref	Ref
Middle	1.57 (0.89-2.77)	1.07 (0.63-1.81)	0.71 (0.42-1.21)
Low	2.50 (1.30-4.77)	1.51 (0.86-2.66)	0.93 (0.53-1.63)
CES-D (score)			
Low	Ref	Ref	Ref
High (≥25)	1.07 (0.45-2.55)	1.13 (0.51-2.49)	1.46 (0.64-3.29)
GARS (score)			
Low	Ref	Ref	Ref
Middle	1.10 (0.58-2.11)	1.17 (0.66-2.07)	1.08 (0.61-1.90)
High	0.72 (0.39-1.32)	0.82 (0.47-1.43)	0.85 (0.49-1.48)
NRT applied weeks			
<4	Ref	Ref	Ref
≥4	2.62 (1.55-4.40)	1.36 (0.83-2.20)	1.35 (0.83-2.22)
Intervention			
Conventional counseling	Ref	Ref	Ref
Health risk appraisal	1.66 (1.02-2.71)	1.24 (0.81-1.92)	1.19 (0.77-1.83)

*OR=odds ratio; CI=confidence interval; FTND: Fagerström Test for Nicotine Dependence; CES-D: Center for Epidemiological Studies-Depression Scale; GARS: Global Assessment of Recent Stress; KTSND: Kano Test for Social Nicotine Dependence; KSCMS: Kim's Smoking Cessation Motivation Scale; SET: Smoking: Self-Efficacy/Temptation; MNWS: Minnesota Nicotine Withdrawal Scale; NRT: Nicotine replacement therapy

statistically different in the both groups. The psychometric properties, such as FTND, CES-D, GARS, KTSND, KSCMS, SET, and MNWS, of the both groups were also not statistically different. The intervention group visited the clinic 5.4 (±2.6) times in average, while the control group did 4.9 (±2.6) times in average. The difference was not statistically significant (p<0.082). NRT was used in average 4.0 (±2.0) times in the control group and was used in average 4.3(±1.8) times in the intervention group. This difference was also not statistically significant (p<0.103).

Table 2 shows smoking cessation rates in the intervention and control groups. The rates were obtained by self-reported questionnaire and validated data, such as exhaled CO (at week 4 and 24) and urinary cotinine (at week 12). At 4-week follow-up, we found from self-reported questionnaire that 67.9% quit rate among the control group and 77.8% among the intervention group. There was 9.9% (95% CI: 0.5-19.5%) difference between two groups. The validated data with exhaled CO shows that 49.1% of the control group successfully quitted, while 61.1% of the intervention group did. The intervention group with KHRA had 12.0% (95% CI: 1.4-22.6%) higher quit rate and the difference was statistically significant. At 12-week follow-up, 51.5% of the control group answered that they quitted smoking, while 58.1% of the case group did that. However, according to the validated test with urinary cotinine, 23.0% of the control group successfully quitted, while 28.1% of the intervention group did. The difference was not statistically significant. At 24-week follow-up, 44.2% of the control group said that they quitted smoking, while 47.9% of the intervention group did. However, according to the validated test with exhaled CO measurement, only 17.6% of the control group successfully quitted, while 21.6% of the intervention group did. The difference was also not statistically significant.

Table 3 shows the predictors of successful quitting (based on validated data). At 4-week follow-up, age over 50 years old (OR 1.38, 95% CI: 0.78-2.44), KHRA (OR 1.66, 95% CI: 1.02-2.71), middle range of KSCMS score (OR 2.18, 95% CI: 1.16-4.09), higher SET score (OR 3.04, 95% CI: 1.66-5.55), lower KTSND (OR 2.50, 95% CI: 1.30-4.77), higher educational level (OR 0.47, 95% CI: 0.26-0.87) and NRT over 4 weeks (OR 2.62, 95% CI: 1.55-4.40) were associated with successful quitting. At 12-week follow-up, age over 50 years old (OR 2.72, 95% CI: 1.54-4.79), lower FTND score (OR 1.84, 95% CI: 1.15-3.63), higher SET score (OR 1.89, 95% CI: 1.05-3.06) were associated with successful quitting. At 24-week follow-up, age over 50 years old (OR 2.02, 95% CI: 1.16-3.52), lower FTND score (OR 1.84, 95% CI: 1.03-3.29), higher SET score (OR 1.79, 95% CI: 1.05-3.06) were associated with successful quitting.

Discussion

The current male smoking prevalence in South Korea is 47.3% as of 2011, thus developing effective smoking cessation program is essential for better tobacco control in Korea. We applied KHRA to the current smoking cessation program, which is mainly focusing on counseling, and

found that KHRA was effective in short term (4-week follow-up), however, it was not in longer terms, such as 12-week and 24-week follow-ups.

Our finding was similar with the existing literature. Biomedical risk assessment, including exhaled CO, lung function, and lung cancer sensitivity, was often employed for smoking cessation program, however, the approach did not make difference in the rate of successful quitting after six months (Audrain et al., 1997; Lerman et al., 1997; Ito et al., 2006).

A previous study found that the intervention group who had been measured exhaled CO during the cessation clinic and measured it again after 6 months was 1.06 times more likely to quit smoking compared to those who were not offered the measurement. However, the difference was not statistically significant (95% CI: 0.85-1.32) (Risser et al., 1990). Other studies also found that using spirometry to test lung function was not effective (95% CI: 0.77-1.81) (Buffels et al., 2005; 2006; Wilt et al., 2007). Another study which employed artery sonography in order to show smokers their plague into the carotid artery and femoral artery found that the case group who showed plague was 2.77 times more likely to quit compared to the control group and the difference was statistically significant (Bovet et al., 2002). In turn, a second larger study of a similar feedback mechanism did not detect evidence of an effect (Rodondi et al., 2012). Meanwhile, Parkes et al. (2008) who adopted HRA to improve smoking quit rate found that the HRA with the concept of "lung age" was effective. The effects of smoking cessation counseling using biomedical aids were controversial according to different study designs. The study of a structured motivational intervention using spirometry information in the primary care setting is now under way to determine its effectiveness (Martin-Lujan et al., 2011).

Based on Parkes's study design, we developed this present study with KHRA and the results suggested that KHRA for smoking cessation program was effective only for short term. The possible explanation that KHRA was not effective for long term cessation can be number of intervention and time of intervention provided. KHRA was provided to the participants on the second and sixth week visits, therefore, KHRA was effective shortly in the fourth week and may have been effective in the eighth week. More frequent and continuous booster intervention with KHRA may improve smoking cessation rates during the long-term follow-up.

Of course, there are fundamental differences between our study and Parkes's study. The participants in the Parkes's study were recruited from five general practices and were not specifically motivated to quit. On the contrary, our study took people who were all motivated to quit and visited smoking cessation clinic voluntarily. So, the impact of KHRA may be lessened in our study subjects as they were already motivated to quit smoking compared to those of the Parkes's study. Further study is needed to evaluate the long-term efficacy of KHRA in tobacco dependence treatment and to establish the indication and target population of this tool.

Meanwhile, we found that those over the age of 50 years old, lower FTND and higher SET score were the predicting factors for the 24 weeks smoking cessation success. Based on this finding we should focus on current smokers aged 50 years or younger, those who have higher FTND and those who have lower SET score to decrease the men's smoking prevalence in Korea.

In age-subgroup analysis among the participants aged over 50 years old, the intervention group showed better smoking cessation compared to the control group. Most smokers aged over 50 years old experienced that KHRA showed older age compared to their actual age, thus, the group effectively responded to the KHRA.

There are caveats to the study. Firstly, we hypothesized successful smoking cessation rate of the intervention group to 30% and 15% for the control group. Based on the hypothesis, we needed 163 participants for each group as the proper sample size. However, the difference of smoking cessation rate was about 10% which means that we needed at least 356 participants for each group. This smaller sample size may have affected the results. Secondly, we excluded female smokers because there were not many registered female smokers in the smoking cessation clinic. Therefore, the finding should not be applied to female smokers. Further study is needed to target female smokers. Finally, we could not measure biomarkers for all the participants because there were some participants who did not visit the center for the measurement. So we called them and used their self-reported records of successful quitting for the analysis.

In conclusions, given the re-increased smoking prevalence, in particular, among men in Korea, it is essential to develop a better intervention in order to increase successful quitting. We adopted KHRA for the smoking cessation program in a public health center and found that the smoking cessation program with HRA was effective for successful quitting. However, it was only effective short term. Further efforts and study are needed to improve the effectiveness of the smoking cessation program with HRA.

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References

Alexander G (2003). Health risk appraisal. *Int Electron J Health Educ*, **3**, 133-7.

Audrain J, Boyd NR, Roth J, et al (1997). Genetic susceptibility testing in smoking-cessation treatment: one-year outcomes of a randomized trial. *J Addict Behav*, **22**, 741-51.

Bovet P, Perret F, Cornuz J, et al (2002). Improved smoking cessation in smokers given ultrasound photographs of their own atherosclerotic plaques. *Prev Med*, **34**, 215-20.

Buffels J, Degryse J, Decramer M, et al (2005). Can spirometry improve the success rate of smoking cessation in general practice. *Eur Respir J*, **26**, 670.

Buffels J, Degryse J, Decramer M, et al (2006). Spirometry and smoking cessation advice in general practice: a randomised clinical trial. *Respir Med*, **100**, 2012-7.

Doll R, Peto R, Wheatley K, et al (1994). Mortality in relation to smoking: 40 years' observations on male british doctors. *BMJ*, **309**, 901-11.

Fletcher DJ, Smith GL (1986). Health-risk appraisal. helping patients predict and prevent health problems. *Postgrad Med*, **80**, 69-71.

Ito H, Matsuo K, Wakai K, et al (2006). An intervention study of smoking cessation with feedback on genetic cancer susceptibility in Japan. *Prev Med*, **42**, 102-8.

Jayakirshnan R, Uutela A, Mathew A, et al (2013) Smoking cessation intervention in rural Kerala, India; findings of a randomised controlled trial. *Asian Pac J Cancer Prev*, **14**, 6797-802.

Karimy M, Niknami S, Heidarina AR, et al (2013). Refusal self efficacy, self esteem, smoking refusal skills and water pipe(hookah) smoking among Iranian male adoescents. *Asian Pac J Cancer Prev*, **14**, 7283-8

Kim J (2004). The predictive accuracy of health risk appraisal in Korean males: using national health insuarance incorporation program. MPH Thesis, Seoul National University.

Lerman C, Gold K, Audrain J, et al (1997). Incorporating biomarkers of exposure and genetic susceptibility into smoking cessation treatment: effects on smoking-related cognitions, emotions, and behavior change. *Health Psychol*, **16**, 87.

Lin M, Huang S, Shih W, et al (2013). Effects of an anti-smoking program to prevent lung cancer among urban aboriginals in Taiwan. *Asian Pac J Cancer Prev*, **14**, 6451-7.

Martin-Lujan F, Piñol-Moreso JL, Martin-Vergara N, et al (2011). Effectiveness of a structured motivational intervention including smoking cessation advice and spirometry information in the primary care setting: the ESPITAP study. *BMC Public Health*, **11**, 859.

Oh J, Lim MK, Yun EH, et al (2013). Cost and effectiveness of the nationwide government-supported smoking cessation clinics in the republic of Korea. *Tob Control*, **22**, 73-7.

Park J (2007). The development and validation of health risk appraisal (HRA) in Korean men and women. PhD Thesis, Seoul National University.

Parkes G, Greenhalgh T, Griffin M, et al (2008). Effect on smoking quit rate of telling patients their lung age: the step2quit randomised controlled trial. *BMJ*, **336**, 598-600.

Risser NL, Belcher DW (1990). Adding spirometry, carbon monoxide, and pulmonary symptom results to smoking cessation counseling. *J Gen Intern Med*, **5**, 16-22.

Robbins L, Blankenbaker R (1982). Prospective Medicine And The Health Hazard Appraisal. Norwalk: Appleton-Century-Crofts.

Robbins L, Hall J (1970). How To Practice Prospective Medicine. Methodist Hospital of Indiana: Indianappolis.

Rodondi N, Collet T, Nanchen D, et al (2012). Impact of carotid plaque screening on smoking cessation and other cardiovascular risk factors: a randomized controlled trial. *Arch Intern Med*, **172**, 344.

Sadusk Jr JF, Robbins LC (1968). Proposal for health-hazard appraisal in comprehensive health care. *JAMA*, **203**, 1108-12.

Stead LF, Perera R, Bullen C, et al (2008). Nicotine replacement therapy for smoking cessation. *Cochrane Database Syst Rev*, **1**, CD000146.

Wilt TJ, Niewoehner D, Kane RL, et al (2007). Spirometry as a motivational tool to improve smoking cessation rates: a systematic review of the literature. *Nicotine Tob Res*, **9**, 21-32.