Continuation of Smoking Cessation and Following Weight Change after Intervention in a Healthy Population with High Smoking Prevalence

Takashi Kadowaki¹, Makoto Watanabe², Akira Okayama³, Kayoko Hishida¹, Tomonori Okamura¹, Naomi Miyamatsu¹, Takehito Hayakawa⁴, Yoshikuni Kita¹ and Hirotsugu Ueshima¹

¹Shiga University of Medical Science, ²Jichi Medical School, ³National Cardiovascular Center and ⁴Shimane University, Japan

Abstract: Continuation of Smoking Cessation and Following Weight Change after Intervention in a Healthy Population with High Smoking Prevalence: Takashi Kadowaki, et al. Department of Health Science, Shiga University of Medical Science—Smoking prevalence among males is conspicuously high in Asian countries including Japan. There are few prospective intervention studies on the duration of smoking cessation within regions with a high prevalence of smokers, such as Asia. We investigated the extent to which subjects continued abstaining from smoking after receiving smoking cessation support provided for all smokers in an occupational setting, regardless of their willingness to quit smoking. The subjects were 251 male workers who were smokers and had received a smoking cessation intervention in 1997 in an occupational setting. Smoking cessation rates and body mass index (BMI) at 10, 18, 30, 42, 54, and 66 months after the initial intervention were confirmed during annual health check-ups. Those who quit smoking following the intervention and continuously abstained from smoking throughout the study period were separately examined for BMI. After five years, 10.6% of the smokers continued smoking cessation. Of the abstainers who quit following the intervention, the abstinence rate decreased in the first and second year, but it stabilized at approximately 45% after the third year. High nicotine dependence and a self-reported lack of willingness to quit smoking did not lower long-term abstinence rates. Abstainers initially gained 1.55 BMI on average, but decreased the weight gain to 0.96 BMI over six years. Introducing smoking cessation support without nicotine replacement therapy is an effective long-term strategy in a healthy population with a high smoking prevalence. Abstainers maintain their smoking cessation if they refrain from smoking for three years.

Key words: Body mass index, Follow-up, Intervention, Smoking cessation, Workplace

Smokers in Japan have experienced nationally implemented smoking environmental changes since 2003¹. In 2003, the Japanese government enacted a new law called the Health Promotion Law, which encourages designation of smoking places in public spaces including occupational settings. Following enactment of the law, the Japanese Ministry of Health, Labour and Welfare announced a new guideline for anti-smoking measures in workplaces. The guideline includes encouragement of education and consultation by medical doctors and occupational health nurses. Thus, health education on smoking cessation for healthy workers in occupational settings is of increasing importance.

There have been several reports in Japan on the effectiveness of smoking cessation intervention in randomized controlled designs²,³. In Western countries, there have been many reports on interventions for volunteer participants or patients in clinical settings⁴,⁵. However, few studies have investigated the effectiveness of smoking cessation interventions for all smokers in a healthy population regardless of their willingness to quit smoking² and the prognosis of abstainers’ smoking status. From the viewpoint of primary prevention in workplaces, it is preferable for smokers to quit smoking prior to developing smoking-related diseases regardless of their willingness to quit smoking.

Many smokers cite weight gain after smoking cessation...
as a primary reason for not trying to quit smoking\(^6\), and an observational study has reported weight gain following smoking cessation\(^7\). However, no study has examined an intervention and consequent weight gain in smokers who achieved smoking cessation.

The smoking issue is especially important in East Asian and West Pacific regions including Japan, since male smoking prevalence in these regions is more than 50%\(^8\). Most occupational health settings, especially in regions with high smoking prevalence, practice primary prevention by occupational health nurses encouraging apparently healthy smokers to quit smoking without nicotine replacement therapy. We have reported to what extent providing support for smoking cessation without nicotine replacement therapy helps smokers succeed\(^9\). We are consequently interested in the extent subjects continue abstaining from smoking once they stop smoking. We are also interested in the changes in body weight observed prospectively in an intervention design. The purpose of this study was to elucidate the prognosis for smoking cessation regarding abstinence continuation and weight change in a healthy male population.

**Subjects and Methods**

The subjects of the 1997 study were all male smokers in an occupational setting: a radiator manufacturing workplace in Japan. We reported the effectiveness of a smoking cessation intervention, and the details are described elsewhere\(^2\). Briefly, 263 male smokers (62.2%) aged 33.3 ± 9.6 (mean ± standard deviation) years were randomized into intervention and control groups. Subjects in the intervention group received individual counseling by a doctor, and those who signed a Smoking Cessation Declaration and expressed an intention to participate in the program underwent a five-month intervention including individual advice, self-help materials and group sessions. Each of the smokers in the intervention group received individual counseling by a physician on smoking cessation, and was periodically counseled for five months without nicotine replacement therapy if he expressed willingness to quit at the initial counseling session\(^9\). At the end of the program, rates of abstinence longer than four weeks were 12.9% and 3.9% in the intervention and control groups, respectively (p=0.003). Subjects in the control group received an equivalent intervention in the following six to ten month period. After excluding 12 subjects who left the worksite for some reason unrelated to health or smoking status during the initial ten months, a total of 35 of the 251 baseline smokers (n=19 from intervention and n=16 from control groups combined) had abainted from smoking for more than four weeks at ten months. Thus, the subjects of the present study were those 251 subjects remaining for more than four weeks at ten months. Thus, the subjects of the present study were those 251 subjects remaining for more than four weeks at ten months.

Informed consent was obtained from each participant prior to the study. The intervention was done for those smokers who agreed to receive a five-month intervention as a primary reason for not trying to quit smoking\(^6\), and an observational study has reported weight gain following smoking cessation\(^7\). However, no study has examined an intervention and consequent weight gain in smokers who achieved smoking cessation.

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Abstinence rates were determined in all previous smokers who had achieved cessation at month 10 (n=35) and in subgroups stratified by nicotine dependence or willingness to quit smoking at baseline. Nicotine dependence was assessed using the Fagerström tolerance questionnaire (FTQ)\(^11\). Those with FTQ scores of 4 or above were categorized as having a medium or high nicotine dependency. Willingness to quit smoking was assessed as positive if a subject chose ‘currently trying to quit smoking’ or ‘willing to quit in the near future’, and negative if he chose ‘maybe in the future’ or ‘not at all willing to quit smoking’.

Height and weight were recorded at the annual checkups, and the subject’s BMI was calculated as body weight (in kg) divided by the square of body height (in m). As the baseline BMI, we used the measurements recorded at the annual checkup in 1996 before the initial intervention. We compared the BMI changes of two groups: the continuous abstainers who continued smoking cessation until the end of our study period; and the continuous smokers who never tried smoking cessation during our study period.

For statistical procedures, we compared the means of continuous variables using t-tests and the proportion using Fisher’s exact tests. We considered the difference significant at P-value <0.05 in two-tailed tests. We excluded those who were lost to follow-up at each survey, because we believed that none of the subjects left the company for reasons related to health or smoking status, and that classifying those who had left the company as recidivists would skew the real rate of abstinence.

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program. The procedure was reviewed and approved by the institutional review board of Shiga University of Medical Science.

Results

The total number of subjects and the number abstaining from smoking at each survey are shown in Table 1. The abstinence rates after three years were approximately 8–10% in subjects who had received support for smoking cessation.

When we looked closely at the 35 subjects who had successfully stopped smoking for more than four weeks at the ten-month point, abstinence rates reduced substantially at the first year, but became stable after three years (Table 1). There was actually no change in the number of continuous abstainers between months 42 and 66, but one of the recidivists left the site at the 55-month point, which accounted for the apparent improvement in the rate.

For the previous smokers whose nicotine dependence was not low (FTQ≥4) and achieved smoking cessation at 10 months, 61.5% abstained from smoking throughout our study period. For the previous smokers who initially were not willing to quit smoking, 47.6% abstained from smoking throughout our study period.

Table 2 shows changes in body weight and BMI, comparing continuous abstainers (n=11) with continuous smokers (n=128). At baseline, there was no statistical difference between the prospective continuous abstainers and habitual smokers in height (171.0 cm vs. 171.3 cm),
weight (64.3 kg vs. 63.8 kg) or BMI (22.0 kg/m² vs. 21.7 kg/m²). In the abstainers, BMI increased by up to 1.55 kg/m² on average, but then gradually decreased. Among the 11 abstainers, four lost weight, two gained less than 1 kg/m² on the BMI index, and one gained more than 3 kg/m² on the BMI index (Fig. 1).

Discussion

We clarified that once subjects had stopped smoking for more than four weeks, the continuation rate was 45%. The cessation rate did not change after three years regardless of their baseline willingness to quit smoking or their nicotine dependence. The overall abstinence rate after three years was approximately 8–10% when all the male smokers in a population of healthy workers were provided with advice by a physician, regardless of their baseline willingness to quit smoking, and follow-up support if a subject expressed his willingness to quit smoking. With regard to the BMI change, there was an increase of up to 1.55 kg/m² on average, but the index gradually decreased and stabilized at a gain of about 1 kg/m² over five years. To our knowledge, this is the first report from an Asian country, where the male smoking prevalence is high, on five year follow-up of smokers receiving smoking cessation program without nicotine replacement therapy regardless of their initial willingness to quit smoking in a healthy workers’ population. The results also showed that those with lower nicotine dependence and those who were positive about smoking cessation were more likely to quit at the initial stage, but the abstinence rates in those with high nicotine dependence and less willingness to quit smoking were not statistically different after one year. Even if the smokers originally had high nicotine dependence and less willingness to quit smoking, their abstinence rates were better than the natural trend of one percent decline per year at that time. The results may serve as a template for smokers’ prognoses when health care providers plan to promote smoking cessation among similar populations.

Regarding long-term follow-up of continuous abstinence, Yudkin et al. reported an eight-year follow-up of smoking patients prescribed nicotine patches in a clinical setting, showing that among those 91 subjects who stopped smoking with nicotine patches prescribed for twelve weeks (11.2%), 48 subjects continued abstinence after eight years. Although we had different indicators and direct comparison is not appropriate, we observed a plateau of approximately 45% in the abstinence rate after 30 months among the subjects who had stopped smoking for more than four weeks at ten months. The major differences in design between these studies were subject characteristics (patients vs. healthy workers) and nicotine replacement therapy (nicotine patches prescribed vs. none).

Regarding change in BMI and smoking cessation, there have been several reports using a cross-sectional design or follow-up observation of cohorts after an interval of several years following smoking cessation. However, they do not reflect the prognosis for successful smoking cessation intervention, but rather the observation of natural trends, and most of them measure the prevalence of obesity (BMI>25 kg/m²) but not the extent to which BMI changes after smoking cessation. To our knowledge, this is the first report on BMI change with subjects measured every year after smoking cessation intervention. Our findings have several public health implications. First, the results provide a projection of the prognosis after intervention on smoking cessation. Another implication is the necessity to continue support for smoking cessation after an initial intervention. The focus of our study was a situation that healthcare providers regularly face, especially in occupational settings; helping out apparently healthy smokers without nicotine replacement therapy before they develop serious smoking-related diseases. This is especially important in populations with a high smoking prevalence, such as in East Asia and the West Pacific, including Japan, since the attributable mortality from smoking is considerably high in these regions. Occupational health nurses often try to lead apparently healthy smokers to quit smoking, and face reluctance from them on the grounds of possible weight gain. We believe that our result provides a useful projection that 45% of the previous smokers continue cessation once they succeed, that continuous support for three years may help them refrain from recidivism, and that they may gain approximately 1 kg/m² on the BMI index.
One weakness of the present study was the small sample size and the high proportion of subjects lost to follow-up: 71 of the 251 subjects (28.3%) left the worksite during the five years of the study, mostly due to personnel restructuring caused by the national economic recession, which was beyond our control. We still believe that this did not distort the smoking status of the original population and the prognosis of the abstainers, because there was no subject who left the worksite for reasons related to health or smoking status, and the lost to follow-up ratios at 66 months in smokers vs. ex-smokers at 10 months were not statistically different (8.3% vs. 11.4%, P = 0.547).

In conclusion, we investigated the prognosis of smokers undergoing smoking cessation intervention without using nicotine replacement therapy in a population with high smoking prevalence regardless of their willingness to quit. This may serve as a model for common primary prevention possibilities in similar populations.

References