

Effectiveness of Annual Interventions for Smoking Cessation in an Occupational Setting in Japan

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Abstract

Objective: To examine the effectiveness of a small-scale smoking cessation intervention program conducted annually for ten years in an occupational setting in Japan.

Methods: We conducted an annual intervention program promoting smoking cessation in male smokers from 1993 to 2002 in an occupational setting in Hyogo, Japan. Trends in smoking prevalence in this worksite were compared with a control group from two similar worksites of the same company. The intervention program was carried out by medical students (the fourth year of a six-year course) who received training on the protocol prior to the intervention. This protocol consisted of one initial group session, followed by periodical correspondence for two months. Successful cessation of smoking was determined by self-declaration of abstinence for longer than four weeks after intervention, confirmed by an expiratory carbon monoxide concentration of less than nine ppm. Smoking prevalence was determined by a self-administered questionnaire provided at the annual health checkup.

Results: The proportion of smokers who participated in the program was 3.47% on average. Abstinence rates following each intervention ranged from 13.3% to 60.0%, with the prevalence of male smokers at the intervention worksite decreasing from 56.2% in 1993 to 47.0% in 2002. In contrast, the smoking prevalence of the control worksites remained largely unchanged, being 60.2% in 1995 and 57.6% in 2002. At the end of the study, the intervention worksite had a significantly lower prevalence of smokers in either the crude or age-adjusted rate.

Conclusion: A small-scale but repeated smoking cessation intervention program at a worksite can reduce smoking prevalence more efficiently than the natural trend.

Key words: smoking cessation, worksite, intervention study, medical students

Introduction

The prevalence of male smokers is extremely high in the East Asian and West Pacific region, including Japan (1). Although the prevalence of male smokers has been decreasing gradually by 0.5–1% every year in Japan (2), the rate still remains high compared to other industrialized countries (1).

Health promotion interventions such as smoking cessation

campaigns are beneficial in occupational settings for several reasons. First, they are cost-effective for both workers and employers (3). Second, health care providers such as occupational nurses or doctors are available in many workplaces, and can therefore provide repeated interventions when necessary. As long as an employee stays in the workplace, it is relatively easy to carry out follow-ups, compared to a community setting. The extent to which risk-reduction interventions are effective depends largely on the adherence of the subjects to the programs (4).

In 2000, the Japanese government introduced 'Health Japan 21' (5), a manuduction containing guidelines for health promotion and prevention of lifestyle-related diseases in Japan for the first ten years of the 21st century. In the section on smoking, it stated that the government and administrative

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agencies should provide accessibility to smoking cessation programs for all smokers willing to quit smoking. In accordance with this guideline, the Japan Health Insurance Union Confederation now conducts health care provider training programs for occupational nurses and health professionals in occupational settings (6).

The effectiveness of an intervention program for smoking cessation was previously proven in an occupational setting through a randomized controlled design (7). The intervention protocols and materials used in the study have been published elsewhere (8). The next step to be examined is the effectiveness of such intervention in the occupational fields conducted as health and safety activities. However, the effectiveness of such interventions conducted annually over a long period has yet to be examined. It is possible that even small-scale but repeated interventions may be effective for promoting smoking cessation. The purpose of this study was therefore to assess the effectiveness of annual interventions for smoking cessation in an occupational setting in Japan.

Methods

Setting and Subjects

The smoking cessation interventions were conducted annually from 1993 to 2002, between August and October, at a chemical plant in Hyogo which was located in the Kinki area in western Japan. The number of employees in 2002 was 1,450, with the majority of these (95.0%) being male. The Health Care Center at the plant conducted an annual campaign called the 'smoking cessation contest.' Posters, company circulars and intranet emails were used to recruit smokers who were willing to quit smoking. Participants interested in the campaign then underwent the intervention program for approximately two months. The main outcome measurement in the study was the prevalence of male smokers at the worksite.

As a control group of worksites, we employed the company's other plants in Shiga and Ibaraki, which had 192 (177 males and 15 females) and 292 (257 males and 35 females) workers in 2002, respectively. These control worksites were selected because the employee's types of work were identical to those at the intervention worksite, and there was no other intervention for smoking cessation before and during the study period at these sites. We used the smoking prevalence of male smokers from 1995 to 2002 at these two worksites. These plants carried out the same type of industry as the Hyogo plant on smaller scales. Although they had identical health care systems, they did not conduct the annual intervention programs for smoking cessation.

Health care provider training

The providers in the smoking cessation program were medical students from Shiga University of Medical Science, Japan, who were in the fourth year of a six-year medical school course. A group of four to seven students was assigned every year to conduct an intervention program for smoking cessation at the Hyogo chemical plant. This program formed part of the practical training for the public health curriculum of the medical course. The students attended one guidance session, three-

or four-day group work sessions and a one-day role-play rehearsal session. They were instructed to study the harmful effects of smoking and the merits of smoking cessation, strategies for effective support and interventions for smoking cessation, and also how to produce health education materials for the program. In the final part of the training program, the students were required to demonstrate knowledge and capability of providing smoking cessation support for smokers in a role-play rehearsal session.

Intervention protocol

The intervention protocol consisted of one group session, followed by correspondence by postal or in-house mail. Initially, the participants attended a group session of approximately one hour, at which the health care providers and participants discussed the harmful effects of tobacco, past experience of abstinence, and the merits of smoking cessation. They also discussed how to stop smoking and overcome the symptoms of nicotine withdrawal. Each participant then decided the date they would stop smoking and signed a declaration form stating that they would cease smoking from that date.

The participants also received letters of encouragement and self-help leaflets on how to stop smoking on five to seven occasions. The first set of materials was sent prior to the start date as a reminder to quit smoking, while the second set was sent three or four days later, the time at which the strongest nicotine withdrawal symptoms were likely to occur. Subsequent materials were provided periodically at one- or two-week intervals for approximately two months. Every time a participant received a letter of encouragement and self-help leaflets, they were requested to fill in and send back a questionnaire card that described their smoking status and brief comments regarding how they felt at each stage. Subsequent materials were selected in accordance with the responses to the questionnaire. Although nicotine replacement therapy was not used in principle in this study, nicotine gum was available at the Health Care Centers if required.

Determination of smoking cessation

At the end of the intervention program approximately two months after the initial meeting, the participants were invited to a closing session at which they discussed their experiences on achieving smoking cessation and reaffirmed their resolve to continue abstinence. They also underwent a measurement of expired carbon monoxide (CO) concentration by a Micro Smokerlyzer (9, 10). Smoking cessation was considered to have been achieved if a participant reported that he had not smoked for more than four weeks including the closing session day, in addition to an expired CO concentration of less than 9 ppm (11).

Outcomes and statistical procedures

The main outcome measure in this study was the prevalence of male smoking in the intervention and control worksites. Smoking prevalence was monitored by a self-administered questionnaire provided at the annual health checkups. The control data for 1993 and 1994 were not available due to technicalities associated with the data management system of the company, and therefore, it was decided that the 1995 data

Table 1 Age distribution of male workers at the smoking cessation intervention and control worksites, 1995 and 2002, JAPAN

	1995			2002		
	Intervention	Control	p-value*	Intervention	Control	p-value*
Number of male workers	1509	419		1378	434	
Mean age (Standard deviation)	38.5 (11.4)	39.8 (11.9)	0.041	39.4 (10.7)	38.3 (11.4)	0.066
Age range (minimum–maximum)	19–67	19–64		20–64	20–69	
Age distribution (%)						
18–29	28.3	24.8		22.2	26.6	
30–39	26.0	24.6	0.234	30.1	24.8	0.096
40–49	25.8	26.7		24.1	30.5	
50–	19.8	23.9		23.6	18.1	

* P-values were obtained through Student’s t-test for age and Chi-square test for the distribution of age groups.

would be regarded as the baseline. The age distributions were adjusted for that of the intervention worksite in 2002.

Categorical variables were examined using Fisher’s exact test and continuous variables were tested by Student’s t-test. All hypothesis testing was two-tailed, and p values of less than 0.05 were considered to be significant.

Results

The number and age distribution of male employees in the intervention and control worksites between 1995 and 2002 are shown in Table 1. As described previously, although the intervention started in 1993, we used the 1995 data as the baseline, as control data from 1993–94 were not available. At baseline, although the mean age of the intervention worksite was lower, the age distribution did not differ significantly. At the end of the study, the mean and distribution of age showed borderline significance.

The number of participants in the intervention program, the participation rate among smokers, and the success rate in each year are summarized in Table 2. Changes in the crude prevalence of smoking in the intervention and control worksites are shown in Figure 1. The prevalence of male smokers in the intervention worksite decreased from 56.2% in 1993 and 52.6% in 1995 to 47.0% in 2002, while in the control worksites it decreased from 58.2% in 1995 to 57.8% in 2002. After adjusting for the age distribution of the intervention worksite at

the end of the study, the smoking prevalence decreased from 51.4% to 47.0% in the intervention worksite, whereas it remained largely unchanged in the control worksite (58.3% to 58.1%). Although we cannot compare the smoking prevalences in 1993 and 94, the intervention worksite showed a significant decrease in both crude and age-adjusted smoking rates in the last two years of the study compared with those of the control worksites.

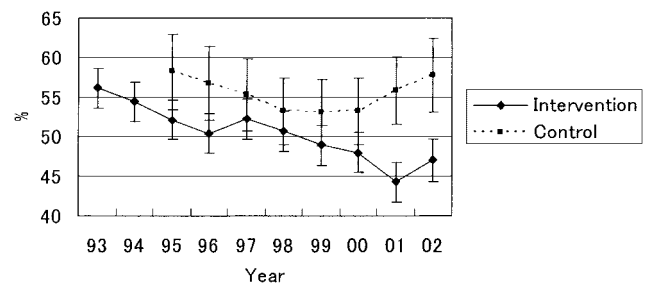


Fig. 1 Crude smoking prevalence in the intervention and control worksites, 1993–2002, JAPAN. Trends in the prevalence of male smokers and 95% confidence intervals in the intervention worksite in Hyogo, 1993–2002, and in the control worksites in Shiga and Ibaraki, 1995–2002. The male smoking prevalence in the intervention worksite decreased from 56.2% in 1993 and 52.6% in 1995 to 47.0% in 2002, whereas in the control worksite smoking prevalence decreased only slightly, from 58.2% in 1995 to 57.8% in 2002.

Table 2 The number and proportion of participants in the smoking cessation campaign and the cessation rate, 1993–2002, Japan

Year	Number of participants	(Participation rate among smokers)	Cessation rate* (%)
1993	36	(4.2)	36.1
1994	34	(4.2)	52.9
1995	22	(4.2)	45.5
1996	15	(2.0)	60.0
1997	35	(4.7)	25.7
1998	28	(3.7)	25.0
1999	29	(4.0)	34.5
2000	19	(2.7)	52.6
2001	18	(2.7)	38.9
2002	15	(2.3)	13.3

* Smoking cessation was determined by self report of abstaining for more than four weeks at the end of the intervention period and expiratory CO concentration of less than 9 ppm.

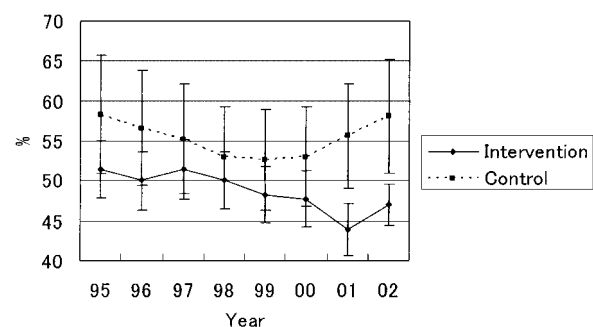


Fig. 2 Age-adjusted smoking prevalence in the intervention and control worksites, 1993–2000, JAPAN. Age-adjusted male smoking prevalence and 95% confidence intervals in the intervention worksite in Hyogo and in the control worksites in Shiga and Ibaraki, 1995–2002. Each prevalence was adjusted for the age distribution of the intervention worksite at the end of the study. The age-adjusted male smoking prevalence in the intervention worksite decreased from 51.4% in 1995 to 47.0% in 2002, whereas in the control worksite it remained essentially unchanged at 58.3% in 1995 and 58.1% in 2002.

Discussion

The present study showed that annual interventions for smoking cessation conducted over a long term at an occupational setting can reduce the prevalence of smoking in the healthy male population. To our knowledge, this is the first report demonstrating the effectiveness of repeated small-scale smoking cessation interventions carried out annually for ten years from Japan, a country in which the prevalence of male smoking is considerably higher than that in many other industrialized countries.

These findings suggest that small-scale interventions can reduce smoking prevalence when carried out annually over the long term. In our study, the proportion of smokers who participated in the study ranged from 2.0–4.2% with 13.3–60.0% of these participants successfully ceasing to smoke. This success rate can be regarded as fairly satisfactory as it is considered that 13% is a reasonable benchmark when assessing the effectiveness of smoking cessation programs in voluntary participants (12). Although the proportion of smokers actually willing to participate in the program was relatively small, we succeeded in leading motivated smokers towards cessation, resulting in a significant reduction in smoking prevalence. The factors inducing a lower smoking prevalence may be diverse; there may be persuasion effects from ex-smokers who successfully quit smoking through the program, or other environmental factors. However, there was no institutional difference between the intervention and control worksites, other than our intervention. The reduction of smoking prevalence may have been the result of all the related factors induced by the conduction of the annual intervention program.

The limitation of this study design is the lack of randomization usually employed in intervention studies; the ideal design would involve gathering a number of worksites with identical characteristics and randomly allocating them to either intervention or control worksites. However, it was difficult to randomize the worksites and we decided not to do it. We still consider that there was little bias, because the worksites were all from one company, they ran the same kind of business, and they had an identical health care system.

With regard to the health care providers required to carry out the smoking cessation intervention programs, we found that appropriate training resulted in effective supporters. Our study involved medical students from the fourth year of a six-year course, who, while having studied basic medicine such as biochemistry, physiology and anatomy for one year, did not have detailed knowledge of diseases and preventive measures. The results of our study suggest that any existing health professionals working in occupational settings could provide effective support for smoking cessation. In our protocol, the health care providers had personal meetings with the participants at the beginning and end of the study in addition to several communications using postal or in-house mail systems. This protocol is both simple and convenient, and therefore, may have the potential for use by existing health professionals in many occupational settings.

In conclusion, this study showed the effectiveness of a small-scale smoking cessation intervention program conducted annually in a worksite in Japan. Although the impact of the intervention at each time was relatively small, by repeating the small-scale interventions annually, the smoking prevalence was reduced more efficiently than that by the natural trend.

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