

Factors Influencing the Intention to Quit Smoking among Wage Workers in Korea

¹Young-Sook Kwon

Abstract: *Background/Objectives: Intention to quit smoking (ITQ) is a precondition for the preparation and practice of smoking cessation. The purpose of this study was to identify the characteristics affecting ITQ amongst wage workers.*

Methods/Statistical analysis: *Data sets from the 2014 and 2016 Korean National Health Examination Survey (KNHANES) were used. The subjects were 940 (823 males and 117 females) workers who currently smoked, aged 19 to 64 years old. ITQ was defined as the presence of a plan to quit within one or six months. In order to understand which characteristics of the participants related to ITQ, socio-demographic, health-related, health behavioral, smoking-related, and work-related factors were investigated. Multiple logistic regression analysis was performed to confirm predictors of ITQ.*

Findings: *Of 940 subjects, 39.3% (n = 369) of smoking subjects had ITQ. In univariate analyses, workers with an ITQ were more educated, more likely to have experience in weight control, drank less alcohol per week, participated in vigorous intensity leisure activity, smoked fewer cigarettes per day, attempted to quit smoking in the past, were more engaged in non-manual work, and worked longer hours per week. In multiple logistic regression analysis, previous attempts to quit smoking, daily smoking amount, and frequency of drinking per week had significant influence on ITQ.*

Improvements/Applications: *In order to increase success rate of smoking cessation in the workplace, targeted implementation of an intervention program should be considered for workers who have previously tried to cease smoking.*

Keywords: Intention, Quit, Worker, Alcohol Drinking, Smoking-Related.

I. INTRODUCTION

In Korea, the rate of people who smoke daily from 15 years old or older was 5.9% over five years, down from 22.9% in 2010 (male 40.8%, female 5.2%) to 17.3% in 2015 (male 31.4%, female 3.4%). The smoking rate for males decreased sharply from 40.8% to 31.4%; however, it still remained higher than the 22.9% OECD average [1]. According to the Ministry of Health and Welfare [2], smoking rate for adults aged 19 and over had decreased from 66.3% in 1998, 48.3% in 2010, and 39.4% in 2015. Nevertheless, smoking rates still remain relatively high. The female smoking rate was 6.5% in 1998, 6.3% in 2010 and 5.7% in 2014, but according to age group, smoking rates were 8.9% for females in their 20s and 7.0% for those in their 30s. These figures too were higher than average. According to analysis of the third Working Condition Survey in 2011 [3], the smoking rate among male workers was 54.5%, while that of female workers was 6.3%. The smoking rate amongst male workers was thus higher than

that of adult males in general (47.3%).

The Korean government had proposed reductions of the adult male smoking rate by 29.0% and the female smoking rate by 6.0% in 2020 as an indicator of smoking cessation for Health Plan 2020 (2016-2020). In order to achieve the target indicator value for promotion of worker health, the current smoking rate for male workers should be reduced from 39.7% in 2015 to 30% in 2020 [4]. Smoking amongst workers is closely related to absenteeism, accidents, and disasters, and is reported as a factor that hinders normal work activity [5,6]. It also incurs enormous socio-economic costs [7]. Therefore, in order to maintain worker health and improve work efficiency, an effective smoking cessation strategy is needed to encourage cessation and reduce the risk of illness and incidence of absenteeism and accidents [8]. Given the considerable amount of time workers spend at the workplace, efficient smoking cessation programs on site would benefit not only worker health but may also contribute to reduced social costs and increased work productivity [9]. A study examining various smoking cessation programs has shown that, regardless of intervention method, smoking cessation programs are cost-effective in almost all cases [10]. Therefore, optimizing program efficiency through customization according to workplace characteristics would be of great potential benefit [8].

Smoking cessation is effective when it involves utilization of a subject's voluntary motivation. According to the trans-theoretical model, smokers undergo various stages of behavioral change until smoking cessation is implemented. In this process, contemplating or planning cessation of smoking, i.e. ITQ, is a prerequisite for the preparation and practice of smoking cessation [11]. In a study conducted in China, 31% of male smokers reported having a desire to quit smoking [12]. Among Korean adult males, 21.8-65.6% [13,14] of smokers were found to have ITQ. Thus far, studies examining the intention to cease smoking have mainly focused on certain population groups [15], adolescents living in the community [16], or patients of public health facilities [17]; however, there has been a lack of research to identify factors influencing ITQ among wage workers. ITQ is presented as a predictor of successful smoking cessation [11], and therefore, it is necessary to systematically analyze the variables that influence ITQ amongst workers. This study was conducted to provide basic data for interventional planning and development of educational programs for smoking cessation by identifying factors that significantly influence ITQ amongst wage workers.

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Young-Sook Kwon, Associate Professor, Department of Nursing,
Joongbu University, Geumsan-Gun, Chungnam, Korea.

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II. MATERIALS AND METHODS

2.1. Study participants

The data for this study was extracted from the Korean National Health Examination Survey (KNHANES) conducted in 2014 and 2016. PHQ-9, a 9-item questionnaire used in primary care for depression screening, was not investigated in 2015, thus data for that year was not included in this study. Total number of participants was 15,700. Of these, 940 wage workers who currently smoked were selected for analysis.

2.2. Research instruments

In response to the question ‘Do you plan to quit smoking in the future?’, an answer of ‘there is a plan to quit within one month’ or ‘plans to quit within 6 months’ was considered to have an intention to quit smoking (ITQ). Answers of ‘I am going to quit sometime not within 6 months’ or ‘I do not intend to quit at all’ were deemed as not having an intention to quit smoking. ITQ was analyzed as the dependent variable. Independent variables included the following: socio-demographic characteristics (gender, age, marital status, education, household income), health-related characteristics (obesity, perceived somatotype, weight control for 1 year, chronic disease, perceived health status, perceived stress, depression), health behavior characteristic (frequency of drinking per week, moderate intensity leisure activity, vigorous intensity leisure activity, aerobic physical activity), smoking-related characteristic (previous attempts to quit smoking, number of cigarettes per day, current use of electronic cigarettes, exposure to secondhand smoking at workplace or home) and work-related characteristic (occupation, employment type, work hours per week). Chronic diseases such as hypertension, hyperlipidemia, myocardial infarction, angina, stroke, tuberculosis, asthma, diabetes were included in the analysis. Occupation was categorized into manual and non-manual (including service or sales) – non-manual workers included office workers, managers, and experts and related workers. Perceived health status was categorized into bad (poor, very poor), moderate, and good (good, very good) in regards to how the participants

thought about their own health. Perceived stress was categorized as low (I rarely feel it, I feel a little bit) and high (I feel a lot, I feel very much), in response to the question, “How much stress do you usually feel in your daily life?”. Depression was estimated using PHQ-9 [18]. The question, “How often did you suffer from the symptoms listed in the last two weeks?” was scored as 0 for “not at all”, 1 for “several days”, 2 for “more than a week”, and 3 for “almost every day”, and the total score ranged from 0 to 27. Total scores in excess of 10 points were designated as depressed. Work hours were classified into ≤ 52 and > 52 hours per week.

2.3. Statistical analysis

Data were analyzed descriptively to examine the characteristics of participants. Chi-square test was used to evaluate associations between characteristics of participants with ITQ (yes/no). Multiple logistic regression analysis was performed to calculate adjusted ORs and 95% CI of the outcome of studied factors on ITQ for the participants. The IBM Statistical Package for the Social Sciences (SPSS) version 24.0 was employed for all data analyses.

III. RESULT

Socio-demographic characteristics of participants are shown in Table 1. Of the 940 subjects total, 87.6% ($n = 823$) were male and 12.4% ($n = 117$) were female. For age, 51.0% ($n = 479$) were 19 to 39 years old. The mean age was 40.5 years ($SD = 10.7$). For marital status, 74.5% ($n = 700$) were married, and 25.5% ($n = 240$) were single (not married, divorced, and widowed). 48.4% ($n = 455$) of participants had graduated from college or higher, and 34.5% ($n = 324$) were quartile 4 (highest) for household income. The relationship between socio-demographic characteristics and intention to quit smoking (ITQ) of study subjects also are summarized in Table 1. Of the 940 subjects, 39.3% had an intention to quit smoking within one month or six months. Educational level showed a significant association with ITQ ($p < .05$). Other characteristics (gender, age, marital status, and household income) were not significantly associated with ITQ.

Table 1: Intention to quit smoking according to socio-demographic characteristics of participants (N=940)

Characteristics	Categories	Total	Intention to quit smoking		χ^2	p
			Yes $n(%)$	No $n(%)$		
Gender	Male	823(87.6)	318(38.6)	505(61.4)	1.053	.305
	Female	117(12.4)	51(43.6)	66(56.4)		
Age (year)	19-39	479(51.0)	202(42.2)	277(57.8)	3.483	.062
	40-64	461(49.0)	167(36.2)	294(63.8)		
Marital status	Married	700(74.5)	265(37.3)	435(62.1)	2.248	.134
	Single	240(25.5)	104(43.3)	136(56.7)		
Education	\leq High school	485(51.6)	172(35.5)	313(64.5)	6.040	.014
	\geq College	455(48.4)	197(43.4)	258(56.7)		
Household income	\leq Quartile 3	616(65.5)	233(37.8)	383(62.2)	1.534	.216
	Quartile 4 (highest)	324(34.5)	136(42.0)	188(58.0)		

The health-related characteristics and health behavioral characteristics of participants are shown in Table 2. 36.5% ($n = 343$) had obesity (BMI 25 kg/m² or more). 43.7% ($n = 411$) thought their body shape was a little obese or very obese.



59.6% (n = 560) had weight control experience during the past year. 15.2% (n = 143) had one or more chronic disease. 73.9% (n = 695) were aware that their health condition was normal or bad. 36.6% (n = 344) of subjects reported that their stress felt high. 7.2% (n = 68) were depressed. 14.5% (n = 136) drank more than four times a week, and 18.1% (n = 170) practiced vigorous intensity leisure activity. Differences in ITQ according to health-related and health behavioral

characteristics are also summarized in Table 2. There were significant differences according to weight control for 1 year in ITQ ($p < .05$) for health-related characteristics, and according to frequency of drinking per week ($p < .001$) and participation in vigorous intensity leisure activity ($p < .05$) for health behavioral characteristics.

Table 2: Intention to quit smoking according to health-related and health behavioral characteristics of participants (N=940)

Characteristics	Categories	Total	Intention to quit smoking		χ^2	p
			Yes	No		
		n(%)	n(%)	n(%)		
Obesity ($BMI \geq 25.0 \text{ kg/m}^2$)	No	597(63.5)	242(40.5)	355(59.5)	1.125	.289
	Yes	343(36.5)	127(37.0)	216(63.0)		
Perceived somatotype	Average or less	529(56.3)	214(40.5)	315(59.5)	0.729	.393
	A little obese, obese	411(43.7)	155(37.7)	256(62.3)		
Weight control for 1 year	No	380(40.4)	131(34.5)	249(65.5)	6.116	.013
	Yes	560(59.6)	238(42.5)	322(57.5)		
Chronic disease	No	797(84.8)	309(38.8)	488(61.2)	0.517	.472
	Yes	143(15.2)	60(42.0)	83(58.0)		
Perceived health status	Bad, Moderate	695(73.9)	270(38.8)	425(61.2)	0.185	.667
	Good	245(26.1)	99(40.4)	146(59.6)		
Perceived stress	Low	596(63.4)	233(39.1)	363(60.9)	0.018	.894
	High	344(36.6)	136(39.5)	208(60.5)		
Depression (PHQ-9)	No (0-9)	872(92.8)	347(39.8)	525(60.2)	1.465	.226
	Yes (10-27)	68(7.2)	22(32.4)	46(67.6)		
Frequency of drinking per week	≤ 3	804(85.5)	334(41.5)	470(58.5)	12.189	<.001
	≥ 4	136(14.5)	35(25.7)	101(74.3)		
Moderate intensity leisure activity	No	669(71.2)	250(37.4)	419(62.6)	3.462	.063
	Yes	271(28.8)	119(43.9)	152(56.1)		
Vigorous intensity leisure activity	No	770(81.9)	290(37.7)	480(62.3)	4.531	.033
	Yes	170(18.1)	79(46.5)	91(53.5)		
Aerobic physical activity	No	486(51.7)	204(42.0)	282(58.0)	3.122	.077
	Yes	454(48.3)	165(36.3)	289(63.7)		

The smoking-related characteristics of participants are shown in Table 3. 80.2% (n = 754) had previously tried smoking cessation. 56.5% (n = 531) smoked more than 10 cigarettes on average per day, and 8.0% (n = 75) were using electronic cigarettes. 41.3% (n = 388) were exposed to secondhand smoke in the workplace, and 9.7% (n = 91) were exposed to secondhand smoke at home. The results of

examining differences in ITQ according to smoking-related characteristics are also summarized in Table 3. There were significant differences for previous attempts to quit smoking and number of cigarettes per day ($p < .001$). The current use of electronic cigarettes and the experience of secondhand smoke did not show significant relationships with ITQ.

Table 3: Intention to quit smoking according to smoking-related characteristics of participants (N=940)

Characteristics	Categories	Total	Intention to quit smoking		χ^2	p
			Yes	No		
		n(%)	n(%)	n(%)		
Number of cigarettes per day	≤ 10	409(43.5)	202(49.4)	207(50.6)	31.179	<.001
	> 10	531(56.5)	137(31.5)	364(68.5)		
Previous attempts to quit smoking	No	186(19.8)	16(8.6)	170(91.4)	91.372	<.001
	Yes	754(80.2)	353(46.8)	401(53.2)		
Current electronic cigarettes	No	865(92.0)	337(39.0)	528(61.0)	0.398	.528
	Yes	75(8.0)	32(42.7)	43(57.3)		
Exposure to secondhand smoking at workplace	No	552(58.7)	211(38.2)	341(61.8)	0.596	.440
	Yes	388(41.3)	158(40.7)	230(59.3)		
Exposure to secondhand smoking at home	No	849(90.3)	333(39.2)	516(60.4)	0.004	.950
	Yes	91(9.7)	36(39.6)	55(60.4)		



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The work-related characteristics of participants are shown in Table 4. 55.9% ($n = 525$) were manual workers, and 56.1% ($n = 527$) were engaged in full-time employment. 73.7% ($n = 693$) were working more than 52 hours per week. The results of examining differences in ITQ according to work-related

characteristics are also summarized in Table 4. There were significant differences by occupation and work hours per week ($p < .05$). The type of employment was not significantly related with ITQ.

Table 4: Intention to quit smoking according to work-related characteristics of participants (N=940)

Characteristics	Categories	Total	Intention to quit smoking		χ^2	p
			Yes	No		
			n(%)	n(%)		
Occupation	Non-manual work	415(44.1)	181(43.6)	234(56.4)	5.921	.015
	Manual work	525(55.9)	188(35.8)	337(64.2)		
Employment type	Regular	527(56.1)	216(41.0)	311(59.0)	1.508	.219
	Non-regular	413(43.9)	153(37.0)	260(63.0)		
Work hours per week	≤ 52	247(26.3)	82(33.2)	165(66.8)	5.155	.023
	> 52	693(73.7)	287(41.4)	406(58.6)		

In order to identify factors influencing ITQ of workers, multivariate logistic regression analysis was performed with eight variables as independent variables. Table 5 presents the result of logistic regression analysis for ITQ in 940 workers. Significant associations were observed between ITQ and frequency of drinking per week, number of cigarettes per day, and previous attempts to quit smoking. The findings demonstrated that the group which had previously attempted to quit was associated with increased likelihood of ITQ

compared to that which did not (OR = 8.80, 95% CI = 5.13-15.09). Individuals who smoked less than 10 cigarettes per day (OR = 1.85, 95% CI = 1.39-2.47) were associated with increased likelihood of ITQ compared to those who smoked more than 10 cigarettes per day. Individuals who drank less than 4 times per week (OR = 1.78, 95% CI = 1.15-2.76) were associated with increased odds of ITQ compared to those who drank more than 4 times per week.

Table 5: Multiple logistic regression analysis of factors for intention to quit smoking in workers (N=940)

Variables	Categories	B	SE	Wals	p	Adjusted OR	95%CI
Education	\leq High school					1	
	\geq College	.162	.166	.951	.329	1.17	0.84-1.62
Weight control for 1 year	No					1	
	Yes	.113	.152	.549	.459	1.11	0.83-1.50
Frequency of drinking per week	≤ 3	.582	.222	6.863	.009	1.78	1.15-2.76
	≥ 4					1	
Vigorous intensity leisure activity	No					1	
	Yes	.128	.187	.469	.493	1.13	0.78-1.64
Number of cigarettes per day	≤ 10	.620	.146	17.983	<.001	1.85	1.39-2.47
	> 10					1	
Previous attempts to quit smoking	No					1	
	Yes	2.175	.275	62.472	<.001	8.80	5.13-15.09
Occupation	Manual work					1	
	Non-manual work	.099	.167	.349	.555	1.10	0.79-1.53
Workhours per week	≤ 52					1	
	> 52	.279	.168	2.758	.097	1.32	0.95-1.83

IV. DISCUSSION

The present study was conducted to identify the impact of socio-demographic, health-related, health behavioral, smoking-related, and work-related characteristics on the intention to quit smoking (ITQ) among Korean wage workers. In this study, 39.3% of workers had the intention to quit smoking, which was similar to results from a study by Moon [19] where 38.5% of smokers aged 19 years or older were planning to quit within 6 months. ITQ according to socio-demographic characteristics of the participants showed significant difference for education level. In a study using the Community Health Survey [20], 26.2% of 2,007 female workers reported ITQ. Analysis of factors affecting ITQ among female workers demonstrated positive correlation

between ITQ and education level. Another study of Korean adults [21] demonstrated similar results. In this study, we found no difference in ITQ according to sex and age; therefore, men and women were not analyzed separately. Jang et al. [20] had reported that 44.6% of female workers in the 19-29 age group had intention to quit smoking; additionally, the higher the age group, the lower was the intention to quit smoking. These findings suggest a need to increase ITQ among young working women. In this study, household income was not significantly associated with the ITQ. A previous study of adult smokers [19]



also demonstrated that education and household income were not associated with ITQ in both males and females. On the other hand, low household income related to lower ITQ amongst female workers [20], implying the role of socioeconomic background in ITQ among female smokers. Thus, it seems necessary for further comparison of the factors affecting ITQ among male and female workers.

ITQ according to health-related characteristics of participants showed significant differences for weight control experience. Weight control experience was previously found to have significant effect on ITQ of female workers [20]. Chronic disease was not associated with ITQ in this study, in which only 15.2% of workers had chronic disease. Gallus et al. [22] had surveyed 3,075 Italian ex-smokers and found that the principal reasons for wanting to quit smoking was the participant's current health status (43.2%) and concern for one's future health (31.9%). In this way, the health status of smokers and thoughts concerning health are considered important factors that influence ITQ; however, the relationship between health status and ITQ is not always consistent. ITQ has been found to be 1.46 times higher in women workers with chronic diseases [20], while other reports suggest that chronic illnesses such as hypertension, diabetes, and asthma are not significantly associated with ITQ [23]. Lee et al. [24] demonstrated that there was a significant and positive association between job stress and the willingness of male workers in 69 small and medium scale industries to cease smoking. In our study, however, stress and depression were not found to be associated with ITQ. More research would thus be required concerning the relationship between ITQ and chronic disease, stress, depression in workers. ITQ showed significant differences according to health behavioral characteristics for frequency of drinking and vigorous intensity leisure activity. We found that for frequency of drinking, workers who drank more than four times a week had lower ITQ; however, alcohol consumption and physical activity has also been shown as not being related to ITQ among female workers after adjusting for control variables [20]. Given the difference in drinking categorization and definition of physical activity, comparisons between the findings of our study and other studies remain difficult to interpret. Nevertheless, workers are faced with frequent situations to drink as a part of the company lifestyle; therefore, improvement of employee lifestyle and workplace culture, particularly in the reduction of drinking frequency would contribute to increased ITQ.

ITQ according to smoking-related characteristics of participants showed significant differences depending on the number of cigarettes smoked per day and previous attempts to quit smoking. ITQ was more likely among workers smoking ≤ 0.5 pack per day than among those who smoked > 0.5 pack per day. These results were consistent with the findings of Kim et al. [13], who studied the factors related to ITQ among 1,740 Korean adult males. The intention of smoking cessation among female workers was similarly high when the overall amount of smoking was low [20]. In our study, 80.2% of subjects had attempted smoking cessation in the past. Among the subjects with no prior attempts to cease smoking, 8.6% had ITQ, while 46.8% of subjects with previous attempts had significantly higher intent for cessation. This finding was

consistent with similar results from previous studies [20,23]. Thus it is important, regardless of the outcome, to encourage subjects with previous cessation attempts to try further. Although the number of attempts to quit smoking was not investigated in this study, the willingness to try further provides the possibility to progress and successfully transfer one's intentions to the action stage. With the assistance of counselling, workers could evaluate pros and cons of various smoking cessation methods and select one which fits their preference. In this study, we considered the influence of various smoking-related factors on ITQ. The age at which one started smoking as well as the overall length of smoking were unavailable and not included, which may have limited the scope of this study.

Work-related characteristics of participants on ITQ showed significant differences according to occupation and working time. Jang et al. [20] demonstrated that ITQ was higher among those with office jobs than with non-office job, as our findings also showed. Kim et al. [25] investigated trends in smoking rates among male workers in three occupational groups showing that heavy smoking rate was higher among manual rather than non-manual workers. The high rate of heavy smoking in manual workers is considered to be one of the causes of low ITQ. It would be effective, therefore, to provide customized intervention plans according to work-related characteristics, such as job type, when planning smoking cessation programs. We were unable to compare the relationship between ITQ and work hours due to a lack of precedent studies; however, we found that the majority of workers (73.7%) were working more than 52 hours per week. Participation in non-smoking education or smoking cessation programs at work should thus provide positive benefit on the intention to quit smoking among wage workers. Further studies would be needed to explore the relationship between ITQ and other work-related factors such as work hours.

Using logistic regression analysis, this study found that previous attempts to quit smoking along with a lower number of cigarettes per day and lower alcohol consumption per week were associated with higher ITQ. Previous attempts to quit smoking had the strongest relation with ITQ (OR = 8.80, CI = 5.13-15.09). Predictors of ITQ derived from the present study showed good consistency with previous studies [14,20,23] which have also shown that previous attempts to quit and the amount of smoking per day are crucial predictors of ITQ. The results obtained using logistic regression analysis indicate that smoking-related characteristics and health behavior, such as alcohol consumption, are important factors for workers to have an ITQ. Therefore, the identification of such factors should be conducted prior to implementation of smoking cessation program for workers.

V. CONCLUSION

Timely provision of smoking cessation programs and counseling by health managers could help ensure ITQ among smoking



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workers and improve successful cessation. Identification of more significant characteristics such as daily amount of smoking and alcohol consumption habits could be utilized to customize more efficient cessation programs. Additionally, encouraging the participation of workers with previous cessation attempts may increase the likelihood of successful smoking cessation campaigns.

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