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Original Article

The Effects of Workplace Rest Breaks on Health Problems Related to Long Working Hours and Shift Work among Male Apartment Janitors in Korea

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ABSTRACT

Background: Rest breaks at work are reported to reduce fatigue and job stress. Apartment janitors in Korea who perform night shift work and work long hours can be exposed to various health problems (HPs). However, few studies have evaluated relationships between their rest breaks and HPs. This study was conducted to examine the relationships between long working hours, shift work, and insufficient rest breaks and HPs among Korean apartment janitors.

Methods: Data on 1,212 selected male apartment janitors were obtained from the 3rd and 4th Korean Working Conditions Surveys. Demographic and occupational characteristics were collected using self-reported questionnaires. Rest breaks at work were classified as "sufficient" or "insufficient." Long working hours were considered as working more than 60 hours per week. Zero-inflated negative binomial (ZINB) regression was performed to investigate the effects of shift work and long working hours on HPs and the effects of rest breaks on relationships between HPs and long working hours and shift work.

Results: Among those with insufficient rest breaks at work, significant associations were found between long working hours and the risk of HPs [odds ratio (OR) = 1.489; 95% confidence interval (CI) = 1.038–2.136] and work-related HPs (WRHPs) [OR 1.621; 95% CI = 1.156–2.272], and between shift work and HPs [OR = 1.603; 95% CI = 1.084–2.372]. These relationships became nonsignificant when sufficient rest breaks were provided.

Conclusion: It is important to provide breaks at work to reduce HPs because of long working hours and shift work among aged workers such as apartment janitors.

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1. Introduction

Apartment janitors in Korea are often referred to as "the old, the sad, and the drowsy" [1]. The first literally reflects age, the second negative motivations regarding working as an apartment janitor because it was the only job they could find after becoming unemployed or retired, and "drowsy" describes the tiredness of janitors caused by very long working hours. Janitors tend to work extremely long hours, even 24-hour shifts [2], and greatly exceed the average hours worked weekly by other Koreans [3]. According to a case study based on interview data, most janitors worked more than 80 hours a week [1]. In addition, apartment janitors perform a wide range of duties such as crime prevention (identifying visitors, patrolling), facility management (parking lot management), cleaning (street cleaning, pruning, separating recyclables), and other services for residents (parking control, postal service

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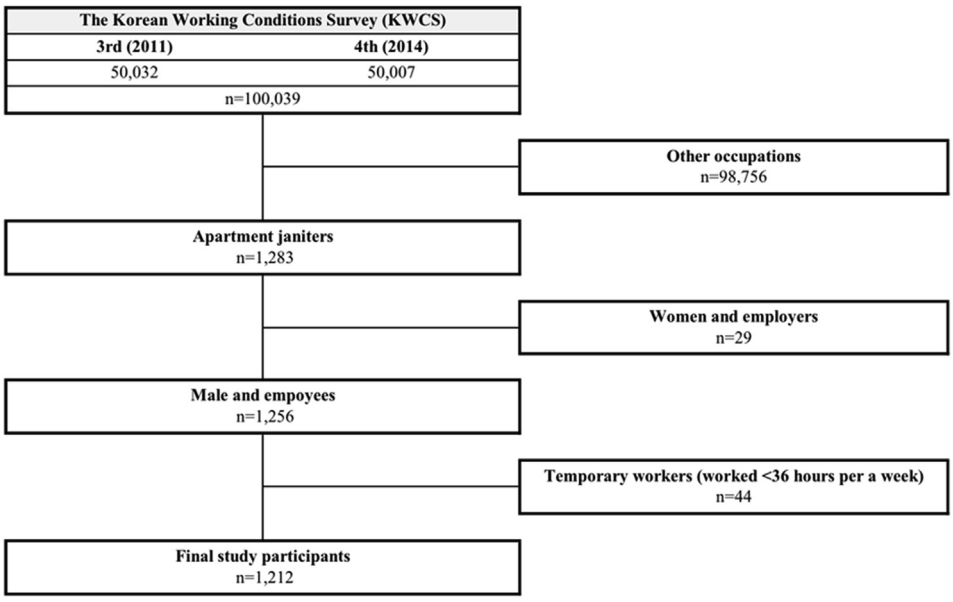

Fig. 1. Flowchart of study participants.

management) [4,5]. Although estimating the number of janitors in Korea is difficult, approximately 225,000 workers were classified as janitors of buildings like apartment complexes, factories, or department stores in 2019 [6].

As elderly workers who work long hours and night shifts, janitors are at risk of various health disorders. These working conditions inevitably lead to fatigue and sleep disturbances [7,8] due to disruption of circadian rhythm [9], that increase the risks of harmful health outcomes like gastrointestinal disorders [10], cardiovascular diseases [11–13], mental disorders (depression and anxiety) [14–16], injuries [17–19], and musculoskeletal pain [20,21]. To make matters worse, elderly workers are more vulnerable to these conditions [22].

Studies on the health effects of long working hours and shift work on Korean apartment janitors are scant. In a recent study on male apartment janitors, 442 occupational injuries were analyzed and risk assessment was performed using industrial accident data [4]. The study found that 91.2% of janitors had experienced a work-related injury and 7.5% a work-related illnesses (e.g., cardiovascular or musculoskeletal disease), and that 88.7% of occupational injuries occurred in those aged $\geq$ 60 years.

Work breaks allow workers time to think of and do things other than work [23], although the benefits of work breaks have received less attention in the literature than those of rest after work [24]. However, the beneficial effects of work breaks are known to be important for worker health [25] and for relieving work-related stress and fatigue [26]. Kim et al. [24] showed that microbreak activities (respite voluntary activities between a consecutive series of tasks) can reduce the negative effects caused by accumulated job demands after work.

In accordance with the Korea Labor Standards Act, employers are required to give employees breaks of at least 30 minutes per 4 hours of work and of at least 60 minutes for 8 hours of work. In other words, employees must be allowed rest breaks during working hours that they can divide as they wish (e.g., one single 60-minute break or four 15-minute breaks per 8 hours). Access to rest breaks at work is especially important in Korea where long working hours are prevalent [27]. In particular, apartment janitors are required to work night shifts and long working hours, and thus, their rest breaks are important health considerations.

The present study was undertaken to (1) elucidate associations between long working hours, shift work, and health problems (HPs) and work-related health problems (WRHPs) among male apartment janitors in Korea and (2) determine the effect of workplace rest breaks on these problems.

2. Methods

2.1. Study population

This cross-sectional study was performed using data collated during the 3rd and the 4th Korean Working Conditions Surveys (KWCSs), which were performed by the Korean Occupational Safety and Health Agency in 2011 and 2014, respectively. KWCSs are conducted on a representative sample of the economically active population older than 15 years and aim to document various characteristics of the Korean working population, including demographic, health-related, and occupational characteristics.

The 3rd KWCS included 50,032 participants, and the 4th KWCS included 50,007 participants. Of these 100,039 individuals, 1,283 had a Korean Standard Classification of Occupations code of "9421" (building concierges), which included "concierges and guards" of apartment complexes or other buildings, and these individuals were regarded as apartment janitors in the present study [4,5]. Of these 1,283 candidate participants, 22 women and 5 employers were excluded because of their different characteristics and working conditions. In addition, 44 individuals who worked less than 36 h per week were also excluded for similar reasons. Finally, 1,212 male employees working as apartment janitors were selected for analysis (Fig. 1).

2.2. Measurements

2.2.1. Long working hours

Working hours were obtained by summing weekly working hours for main and secondary paid work (if any). Long working hours were defined >60 hours per week [2].

2.2.2. Rest breaks

Rest breaks during work were addressed by the question, "Can you take a break at your workplace when you want?" to which 5 responses were possible: "always," "most of the time," "sometimes," "not really," and "not at all." These responses were classified into two categories, that is, sufficient rest breaks at work ("always" and "most of the time") or insufficient rest breaks at work ("sometimes", "not really" and "not at all").

2.2.3. HPs and WRHPs

KWCSs investigated 13 HPs, that is, hearing problems, skin problems, back pain, upper and lower limb pain, headache, and eye pain, stomach aches, dyspnea, cardiovascular diseases, injuries, depression and anxiety, fatigue, and insomnia or sleep disturbance. Participants were asked by a self-reported question whether they had experienced any of these HPs during the preceding 12 months. Individuals that answered "yes" were regarded to have experienced the HP and were then asked if they considered the problem to be work-related. Individuals who also answered "yes" to this question were defined as having experienced a WRHP. After participants had answered these questions, we calculated the total number of HPs and WRHPs each participant had experienced during the previous 12 months.

2.2.4. Covariates

Demographic variables included age (<60, 60–69, or ≥ 70), region (urban or rural), marital status (married or other), educational level (middle school or lower or high school or higher), and income level (<1,500,000 Korean Won or ≥ 1,500,000 Korean Won per month). Occupational variables such as employment status (permanent or temporary), shift work, and night shift work were registered as yes or no.

2.3. Statistical analysis

Chi-square tests were used to determine the distributions of demographic and occupational characteristics and of HPs and WRHPs according to rest breaks. Student *t* tests were used to compare average numbers of HPs and WRHPs by workplace rest breaks. Weighted prevalences and standard errors of total HPs and WRHPs were calculated as per the provision of rest breaks.

Number of HPs and WRHPs per participant ranged from 0 to 8. Count outcomes often show non-normal distributions that are skewed and have a large proportion of zero counts, and this was also found for outcome variables in the present study. Several models are used to perform regressions using count outcomes, for example, the Poisson and negative binomial models and the zero-inflated negative binomial (ZINB) model [28]. In the present study, the ZINB model was selected to determine degrees of association using odds ratios (ORs) and 95% confidence intervals (CIs) because it performs well when comparing Akaike information criteria and Bayesian information criteria, which are the criteria used for assessing model goodness of fit.

Multivariate ZINB regressions were used to estimate the risks of HPs and WRHPs with respect to long working hours and shift work. The regressions were adjusted for age, education level, and income level, which had p-values of <0.10 by univariate analysis with the sum of HPs, whereas region, marital status, and employment status, which had p-values ≥ 0.10 were not included. In addition, ZINB regressions were conducted stratified by workplace rest breaks to determine the effects of work breaks on the relationships between long working hours, shift work, and HPs and WRHPs. Analyses were performed using SAS, version 9.4 (SAS Institute Inc., Cary, North Carolina) and p-values of <0.05 were considered statistically significant.

3. Results

Demographic, occupational, and health-related factors of the study participants and associations between rest breaks and these variables are summarized in Table 1. Most of the 1,212 study participants were in their 60s, married, had an educational level of high school or higher, an income level lower than 1,500,000 Won, a permanent employment status, worked more than 60 hours a week, did shift work, and had insufficient rest breaks at work. They had experienced an average of 1.26 HPs and 0.81 WRHPs during the previous 12 months, although most participants had not experienced a HP (47.9%) or a WRHP (62.4%) (not shown). In relation to rest breaks, the majority had insufficient rest breaks at work (77.0%) and proportions were not significantly different according to age, region, marital status, education level, income level, employment status, weekly working hours, or shift work. The average number of HPs (1.29 vs. 1.15) and WRHPs (0.84 vs. 0.70) was slightly higher in those with insufficient rest breaks, but not significantly so.

Table 2 exhibits associations between each of the 13 HPs (WRHPs) and rest breaks at work. Except for those with extremely low prevalence, the prevalences of most HPs (WRHPs) were higher in those with insufficient rest breaks. However, cardiovascular diseases (3.5% vs. 4.4%) in HPs and lower limb pain (15.7% vs. 16.7%) in WRHPs were not. Only headache and eye pain ($p = 0.0133$) were significantly lower for those allowed rest breaks.

Figs. 2 and 3 show total numbers of HPs and WRHPs. For both HPs (52.9% vs. 47.7%) and WRHPs (68.0% vs. 62.9%), the percentage

Table 1
General characteristics of study participants by workplace rest breaks.

Characteristics	N (%)	Rest breaks at work		*p*-value
		Yes [n (%)]	No [n (%)]	
Total	1,212 (100.0)	276 (23.0)	926 (77.0)	
Age				
< 60	285 (23.5)	68 (23.9)	216 (76.1)	0.8697
60-69	723 (59.7)	161 (22.5)	556 (77.6)	
≥ 70	204 (16.8)	47 (23.4)	154 (76.6)	
Region				
Urban	613 (50.6)	129 (21.3)	477 (78.7)	0.1639
Rural	599 (49.4)	147 (24.7)	449 (75.3)	
Marital status				
Married	1,024 (84.5)	232 (22.9)	782 (77.1)	0.8752
Others	188 (15.5)	44 (23.4)	144 (76.6)	
Educational level				
Middle school or lower	547 (45.1)	127 (23.4)	416 (76.6)	0.8268
High school or higher	665 (54.9)	149 (22.9)	503 (77.2)	
Income level				
≥ 1,500,000 Won	288 (23.9)	57 (19.9)	229 (80.1)	0.1846
< 1,500,000 Won	915 (76.1)	215 (23.7)	692 (76.3)	
Employment status				
Permanent	749 (62.2)	176 (23.6)	571 (76.4)	0.6226
Temporary	456 (37.8)	100 (22.3)	348 (77.7)	
Weekly working hours				
36-60	508 (41.9)	113 (22.5)	390 (77.5)	0.7284
> 60	704 (58.1)	163 (23.3)	536 (76.7)	
Shift work				
No	327 (27.1)	82 (25.5)	240 (74.5)	0.234
Yes	878 (72.9)	194 (22.2)	680 (77.8)	
Rest breaks at work				
No	926 (77.0)			
Yes	276 (23.0)			
Average number of health problems*	1.26 ± 1.59 (0–8)	1.15 ± 1.53	1.29 ± 1.61	0.1944
Average number of work-related health problems*	0.81 ± 1.29 (0–8)	0.70 ± 1.21	0.84 ± 1.31	0.1235

* Mean ± standard deviation (range).

Table 2
Health problems and work-related health problems by rest breaks at workplace.

Health problems and work-related health problems	Rest breaks at work		*p*-value
	Yes [n (%)]	No [n (%)]	
Health problems			
Hearing problem	6 (2.2)	28 (3.0)	0.4548
Skin problem	2 (0.7)	10 (1.1)	1
Backache	32 (11.6)	127 (13.7)	0.3614
Upper limb pain	80 (29.0)	276 (29.8)	0.7934
Lower limb pain	69 (25.0)	207 (22.4)	0.359
Headache, eye pain	38 (13.8)	189 (20.4)	0.0133
Stomach ache	4 (1.5)	15 (1.6)	1
Dyspnea	2 (0.7)	6 (0.7)	1
Cardiovascular disease	12 (4.4)	32 (3.5)	0.4885
Injury	2 (0.7)	8 (0.9)	1
Depression/anxiety	0 (0.0)	11 (1.2)	0.0783
General fatigue	62 (22.5)	243 (26.2)	0.2055
Insomnia or sleep disturbance	9 (3.3)	46 (5.0)	0.2337
Work-related health problems			
Hearing problem	0 (0.0)	4 (0.4)	0.5793
Skin problem	2 (0.7)	3 (0.3)	0.3242
Backache	16 (5.8)	73 (7.9)	0.2453
Upper limb pain	46 (16.7)	189 (20.4)	0.1687
Lower limb pain	46 (16.7)	145 (15.7)	0.6877
Headache, eye pain	21 (7.6)	99 (10.7)	0.1338
Stomachache	1 (0.4)	4 (0.4)	1
Dyspnea	1 (0.4)	1 (0.1)	0.4067
Cardiovascular disease	0 (0.0)	4 (0.4)	0.5793
Injury	2 (0.7)	6 (0.7)	1
Depression/anxiety	0 (0.0)	5 (0.5)	0.5949
General fatigue	52 (18.8)	207 (22.4)	0.2127
Insomnia or sleep disturbance	7 (2.5)	37 (4.0)	0.2571

of those without experience of a HP was higher for those with sufficient rest breaks.

Table 3 shows associations between HPs and WRHPs and long working hours and shift work stratified by rest breaks as determined by adjusted ZINB regression. Increased ORs by ZIBN regressions mean that workers' health worsens as the odds of number of HPs or WRHPs increase according to each working condition. Among all study participants, long working hours were associated with HPs (OR = 1.479; 95% CI = 1.084–2.019) and WRHPs (OR = 1.585; 95% CI = 1.182–2.124). After stratification by rest breaks, long working hours elevated the risk of HPs (OR = 1.489; 95% CI = 1.038–2.136) and WRHPs (OR = 1.621; 95% CI = 1.156–2.272) for those with insufficient rest breaks, but significance was not observed among those with sufficient rest breaks (OR = 1.447; 95% CI = 0.751–2.787, OR = 1.481; 95% CI = 0.768–2.857, respectively). For all study participants, shift work was significantly associated only with HPs (OR = 1.509, 95% CI = 1.080–2.109). After stratification by rest breaks, shift work showed a significant association with HPs (OR = 1.603, 95% CI = 1.084–2.372) among those with insufficient rest breaks, but not among those with sufficient rest breaks (OR = 1.244; 95% CI = 0.625–2.474).

4. Discussion

The results of this study suggest significant associations exist between long working hours (>60 hours per week) and the risks of HPs and WRHPs and between shift work and HPs among Korean apartment janitors. In addition, our results indicate significant relationships between long working hours and the risks of HPs and WRHPs and between shift work and HPs among those with insufficient work rest breaks. However, these relationships were not observed among those with sufficient rest breaks.

These results are in line with those of previous studies, which found long working hours and shift work can impair workers' health. Furthermore, it was suggested in these studies that rest breaks at work can reduce the risk of various HPs. Rest breaks at work are a crucial option for recovery [29] and have been well established to decrease fatigue and improve work performance [30–32]. In addition, they have been shown to enhance cognitive function [36,37] and to reduce musculoskeletal symptoms [33–35], reduce cardiovascular-related risks [38], and to improve mental health [39].

In accordance with theoretical models on recovery at work, continuous work without sufficient recovery causes strain by increasing job demands and by causing an accumulation of negative effects [40], and in other words, it also causes stress by exhausting the resources of individuals [41]. In support of these hypotheses, we found the prevalences and average numbers of HPs and WRHPs were lower in those with sufficient rest breaks, and that the proportions that had not experienced a HP or WRHP were

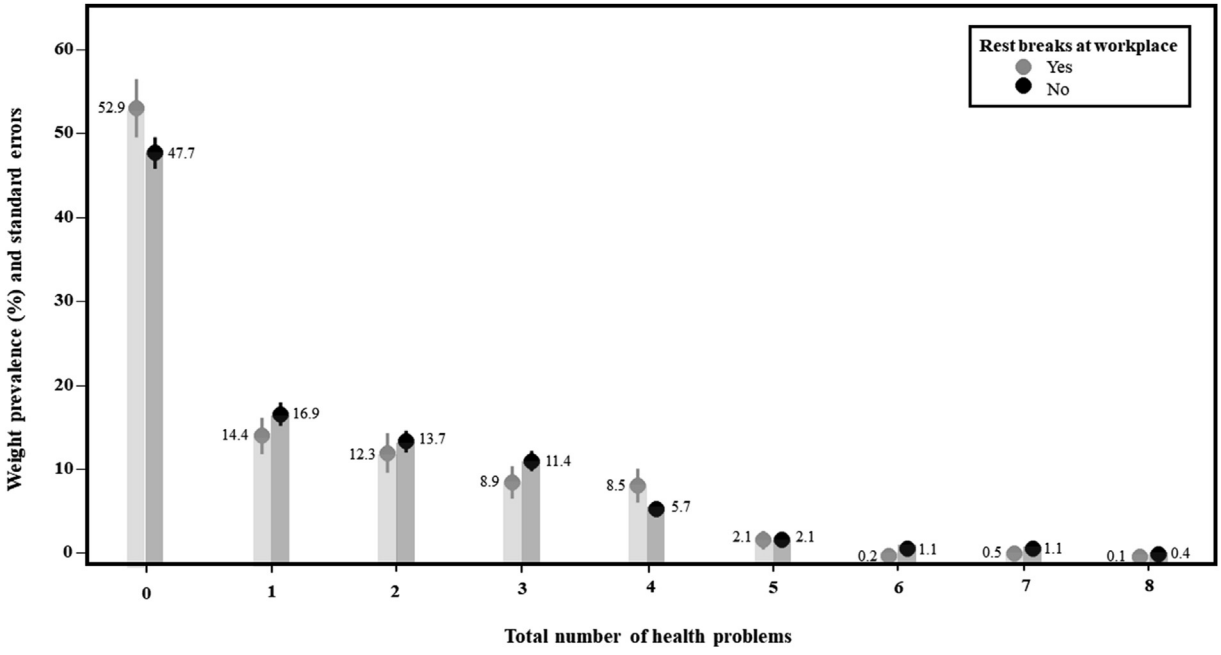

Fig. 2. Weighted prevalences of total number of health problems according to rest break sufficiency.

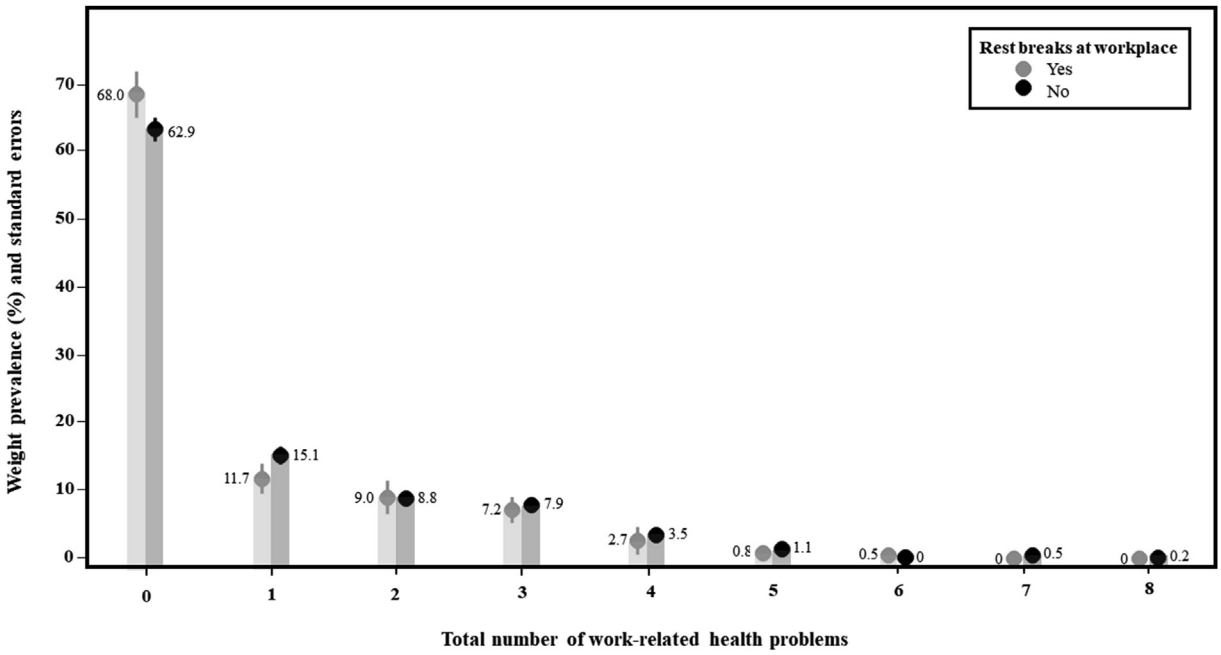

Fig. 3. Weighted prevalences of total number of work-related health problems according rest break sufficiency.

higher in those with sufficient rest breaks. More importantly, the risks of HPs and WRHPs were significantly increased by long working hours and the risks of HPs were significantly increased by shift work when rest breaks were insufficient.

Aging results in chronic systemic inflammation characterized by elevated serum levels of inflammatory cytokines and loss of structural integrity of body organs and tissues, which lead to elevated risks of several diseases such as atherosclerosis, osteoporosis, osteoarthritis, dementia, and cancer [42]. Aging is also known to be associated with sleep disturbances and to impair circadian adjustment to night shift work [22]. Patients with insomnia exhibit physiological hyperarousal, which includes increased electroencephalogram activation, abnormal hormone secretion, and elevated sympathetic nervous system activation during sleep, and because these activations have chronic effects, insomnia is associated with increased risks of depression and cardiovascular problems like hypertension [43]. Without appropriate provision of rest breaks, the adverse impacts of insomnia on health may be increased and elderly workers such as apartment janitors are particularly vulnerable.

Table 3
Odds ratio and 95% confidence intervals for health problems or work-related health problems according to weekly working hours and shift work from the zero-inflated negative binomial regression analyses.

Working condition	Odds ratio (95% confidence interval)	
	Health problem	Work-related health problem
Weekly working hours*		
Total population		
36-60	Reference	Reference
>60	1.479 (1.084–2.019)	1.585 (1.182–2.124)
Sufficient rest breaks		
36-60	Reference	Reference
>60	1.447 (0.751–2.787)	1.481 (0.768–2.857)
Insufficient rest breaks		
36-60	Reference	Reference
>60	1.489 (1.038–2.136)	1.621 (1.156–2.272)
Shift work†		
Total population		
No	Reference	Reference
Yes	1.509 (1.080–2.109)	1.315 (0.951–1.818)
Sufficient rest breaks		
No	Reference	Reference
Yes	1.244 (0.625–2.474)	1.074 (0.534–2.160)
Insufficient rest breaks		
No	Reference	Reference
Yes	1.603 (1.084–2.372)	1.387 (0.950–2.025)

* Adjusted for age group, educational level, income level, and shift work.
† Adjusted for age group, educational level, income level, and weekly working hours.

The average age of participants in the present study was 62.6 years, 72.9% did shift work, and they worked an average of 65.2 hours per week. These figures are similar to the results of a recent study, which reported an average age of 64.8 years, 65.8% worked more than 60 hours per week, 79.8% worked nights, and that participants worked 67.7 hours per week [2]. Recent legislation instituted by the Korean government to limit working hours to 52 hours per week [27] failed to include apartment janitors, and as a result they continue to work much longer hours than other Koreans [2]. In accordance with the Labor Standards Act, apartment janitors are classified as "surveillance or intermittent workers" that perform low-intensity duties, and this was considered reason enough to exclude them from laws protecting workers from long working hours.

As aforementioned, apartment janitors are prone to HPs because they are exposed to a broad range of duties, shift work (including night work), long working hours, and because they tend to be elderly are more susceptible to the health-disrupting effects of insomnia and shift work. Therefore, we recommend as a priority that janitors be provided with appropriate rest breaks at work, regardless of the legal issues that make it difficult to limit their working hours.

This study has several limitations. First, because of its cross-sectional design, caution must be exercised as regards causal interpretations. Second, the loss of significance of relationships between long working hours and HPs and WRHPs in the "sufficient rest" group does not always mean no relationship exists, as it may have been caused by the relatively small sample size. Third, working hours were dichotomized based on 60 hours, which might have affected ORs. However, because more than half of our study participants worked more than 60 hours a week, we believed it appropriate to set the reference at $\leq$ 60 hours. Finally, "sufficient" and "insufficient" rest breaks were determined using degrees of

freedom to rest at work because those who reported more freedom to rest at work were presumed to take rest breaks. However, freedom to rest is not the same as taking breaks, and furthermore, we did not examine the characteristics of workplace rest breaks, for example, numbers, durations, or timings. Further studies are required to investigate the possible effects of different characteristics of actual rest breaks taken on worker health.

In conclusion, long working hours and shift work were significantly associated with HPs in male Korean apartment janitors. Our results also revealed that when workplace rest breaks were insufficient, long working hours increased the risk of HPs 1.49-fold and of WRHPs 1.62-fold, and that shift work increased HPs 1.60-fold, whereas on the other hand, no significant increases were found when sufficient rest breaks were provided. Our results indicate that it is important to provide sufficient rest breaks to reduce health-related problems among male apartment janitors in Korea.

Authors' contributions

S.P. and W.L. contributed to study design. All authors contributed to analysis and interpretation of data and revision and final approval of the manuscript. S.P. contributed in drafting the manuscript.

Conflicts of interest

All authors have no conflict of interest to declare.

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