Association between sleep disturbance and occupational injury among Korean employees

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ABSTRACT

Background: Occupational injury has been a serious social problem steadily. Sleep disturbance is a risk factor for occupational injury. However, there were few researches studied on the linking between sleep disturbance and occupational injury in general working population of Korea. Therefore, we explored the association between sleep disturbance and occupational injury among Korean workers.

Methods: This study used data from the 5th Korean Working Conditions Survey. Occupational injury was assessed by asking work related injury for 12 months prior to the point of the survey. Sleep disturbance was assessed using the Minimal Insomnia Symptoms Scale (MISS). To analyze the association between sleep disturbance and occupational injury, multiple logistic regression analysis was conducted.

Results: The odds ratio (OR) of sleep disturbance group for occupational injury was 2.57 (95% confidence interval [CI]: 1.68–3.93) in the fully adjusted model. For the association between MISS score and occupational injury, it showed increasing trend that ORs increase from the 1st to the 4th quartiles. The OR of 2nd quartile was 1.10 (95% CI: 0.60–2.01), the OR of 3rd quartile was 2.27 (95% CI: 1.53–3.38) and the OR of 4th quartile was 2.80 (95% CI: 1.84–4.26).

Conclusions: Sleep disturbance was associated with occupational injury. In addition, increasing trend was observed between MISS score and occupational injury. These findings imply that developing of intervention programs to manage sleep disturbance and fatigue may be necessary to prevent occupational injury.

Keywords: Occupational injuries; Sleep; Sleep disorders

BACKGROUND

Sleep is indispensable for normal human activity, and sleep disturbance can lead to various health problems, such as increased mortality,1,2 diabetes,3,4 obesity,5,6 and mental disorders.7,8 Approximately 10%, 32%, and 8%–26% of day, night, and rotating shift workers, respectively, have experienced impaired sleep conditions.9 The prevalence of insomnia in Korea in 2013 was estimated to be 1.58%, 2.59%, 3.74%, and 6.50% in their 20s, 30s, 40s, and 50s, respectively.10
Occupational injuries are serious social concern. The industrial accident rate in Korea was 0.58% in 2019. In 2019, 109,242 persons were injured and 855 workers died from occupational accidents in Korea. Korea has the highest death rate by industrial accidents among Organization for Economic Cooperation and Development (OECD) countries alongside low industrial accident rate which is eccentric statistics. It was reported that more than 80% of industrial accidents might be concealed. Occupational injury grows significant social costs due to lost income, compensation costs, disability, and long-term health problems. Therefore, the underreporting of occupational injury should be addressed, and countermeasures to prevent occupational injury should be implemented. Previous studies in other countries have reported that sleep disturbance is a significant risk factor for occupational injury. A meta-analysis estimated that about 13% of work injury could be affected by sleep problems in 2014. There were some researches studied the association between sleep disturbance and occupational injury in Korea, however, they had some limitations. One study examined the associations between working conditions and occupational injury in 2017 using the 4th Korean working conditions survey (KWCS). Nonetheless, the survey contained only one question related to sleep disturbance and the authors did not focus on sleep disturbance. Sleep disturbance has also been related to fatal occupational traffic accidents. Further, an association was found between sleep hours and occupational injury among ship-building supply workers. Nevertheless, there have been no large-scale study targeting Korean general population using validated tool about sleep disturbance. Thus, the objective of this study was to investigate the association between sleep disturbance and occupational injury in general working Korean population using a validated questionnaire to assess sleep disturbance. Additionally, we studied how each question of Minimal Insomnia Symptoms Scale (MISS) relates to occupational injury.

METHOD

Study participants
This study used data from the 5th KWCS, which was conducted by the Occupational Safety and Health Research Institute (OSHRI) of Korea. The survey comprised 50,205 participants. Of these, paid workers (n = 37,132) were included in the analysis of this study. Self-employed persons without employees (n = 7,709), self-employed persons with employees (n = 2,998), non-paid familial workers (n = 2,162), and other workers (n = 204) were excluded from the analysis (Fig. 1). Non-respondents to any of the questions were also excluded from the analysis.

Study variables
Sleep disturbance
Sleep disturbance was estimated using a question that was assessed by the MISS. There were 3 sleep-related symptoms listed: i) Difficulty falling asleep; ii) Waking up repeatedly during the sleep; and iii) Waking up with a feeling of exhaustion and fatigue. Participants selected an answer to each question. The MISS scoring method, assigned 0–5 points to each response: 0 “never,” 1 “less often,” 2 “several times a month,” 3 “several times a week,” and 4 “daily.” The scores for each item were aggregated within a range of 0 to 12 points. Based on the study about the design of MISS, ≥ 6 points was regarded as sleep disturbance, and < 6 points was regarded as normal sleep. For every sleep-related symptom, participants who responded with “never,” “less often,” or “several times a month” were regarded as having no symptom, and those who responded with “several times a week” or “daily” were regarded as having symptoms. To assess trend between MISS score and occupational injury, MISS score was categorized into quartiles as
follows (1st quartile: 1 point; 2nd quartile: 2 points; 3rd quartile: 3–4 points; and 4th quartile: >4 points). The value of Cronbach’s α of MISS is 0.73, and the area under the receiver operating characteristic curve was 0.92 (standard error = 0.01; 95% confidence interval [CI]: 0.89–0.94).

**Occupational injury**

Occupational injury was estimated using the question: “Over the last 12 months, did you have any of the following health problems?” including “Injury(ies),” and “[If yes] Are your health problems due to your job?” Occupational injury was considered when the answer was “Yes” for “Injury(ies)” in both questions.

**Covariates**

The variables known to be associated with sleep disturbance and occupational injury were included in this analysis. Sex, age, education level, income, employment status, occupation, weekly working hours, shift work and perceived risk at work were the control variables. The participants were classified into different age groups: 15–39, 40–49, 50–59, ≥ 60 years. Education level was classified as middle school graduation or lower, high school graduation, or college graduation or higher. Income was classified into 4 quartiles based on average monthly income. Employment status was categorized as regular, temporary, or daily. Occupation was classified as professional & managerial, clerical, sales and service, or manual. Weekly working hours were classified as 1–34, 35–40, 41–52, 53–60, and ≥ 61 hours. Shift work was indicated by “Yes or “No.” Perceived risk at work was categorized as “Risk (−)” or “Risk (+).”

**Statistical analysis**

The characteristics of the study population by sleep disturbance, and occupational injury and related factors are presented using numbers and proportions. Survey-weighted logistic regression analysis was performed to investigate the association between sleep disturbance and occupational injury. Odd ratios (ORs) and 95% CI were calculated for the unadjusted model; Model 1, adjusted for age, sex, education level, income, occupation, employment status; Model 2, adjusted for the factors in Model 1, along with shift work and working hours; and Model 3, adjusted for the factors in Model 2, along with perceived risk at work.
The 5th KWCS conducted multistage-stratified sampling that reflected the 2010 census and inquired on socioeconomic demographics, working conditions, health status, and occupational characteristics, and included a weight variable for the data to describe the working population in Korea. The design weight was determined by sample design non-response rate and post-stratification. All statistical analyses were performed using STATA 16.1 (StataCorp., College Station, TX, USA).

**Ethics statement**

The study was approved by the Institutional Review Board of Dong-A University Hospital (DAUHIRB-EXP-21-091).

**RESULTS**

Table 1 presents the characteristics of the study population by sleep disturbance. There was a higher proportion of female, older age, and lower education individuals who had sleep disturbance. In terms of job characteristics, participants with lower income, temporary employment, occupation in the sales and service field, long weekly working hours, shift work and having perceived risk at work were more likely to have sleep disturbance. The proportion of having experience of sleep disturbance of shift workers (8.9%) were analogous to the result of aforementioned study. The proportion of having experience of sleep disturbance of age 15–39 (6.1%) and 40–49 (6.6%) were higher than the research about sleep disturbance aforementioned (1.58% in 20s, 2.59% in 30s, 3.74% in 40s).

Occupational injury and related factors are shown in Table 2. In terms of sleep characteristics, there was a high proportion of having sleep disturbance, high MISS score, waking up repeatedly during the sleep, waking up with a feeling of exhaustion and fatigue to have occupational injury. Participants who is male, younger age, lower education, lower income, manual worker, and shorter weekly working hours were more likely to experience occupational injury.

Table 3 shows the association between sleep disturbance and occupational injury by subgroups using univariable logistic regression analysis. In most subgroups, participants with sleep disturbance were more likely to have occupational injury than normal. The exceptions were age 40–49 (OR: 0.79; 95% CI: 0.27–2.35) and sales & service workers (OR: 0.96; 95% CI: 0.33–2.83). which were not statistically significant.

Table 4 shows the association between sleep disturbance and occupational injury by logistic regression analysis. Participants with sleep disturbance were more likely to have occupational injury than normal participants when fully adjusted (OR: 2.57; 95% CI: 1.68–3.93). The association between MISS score and occupational injury showed increasing trend in which ORs increased sequentially from the 1st to the 4th quartile in every model. In Model 3, compared to the first quartile, MISS score had greater risk of occupational injury (OR: 2.80; 95% CI: 1.84–4.26).

The association between sleep-related symptoms and occupational injury by logistic regression analysis is presented in Table 5. Participants with symptoms were more likely to have occupational injury than normal participants for every symptom. However, the result of the symptom “Difficulty falling asleep” was not statistically significant (OR: 1.15; 95% CI: 0.57–2.35).
### Table 1. Characteristics of the study population by sleep disturbance

| Characteristics               | Total     | Sleep disturbance (−)* | Sleep disturbance (+)* |
|------------------------------|-----------|------------------------|------------------------|
| **Sex**                      |           |                        |                        |
| Male                         | 21,083 (56.8) | 19,747 (93.7)         | 1,336 (6.3)            |
| Female                       | 16,037 (43.2) | 14,881 (92.8)         | 1,156 (7.2)            |
| **Age**                      |           |                        |                        |
| 15–39                        | 16,160 (43.5) | 15,167 (93.9)         | 993 (6.1)              |
| 40–49                        | 9,386 (25.2)  | 8,763 (93.4)          | 624 (6.6)              |
| 50–59                        | 7,450 (20.0)  | 6,879 (92.3)          | 571 (7.7)              |
| ≥ 60                         | 4,124 (11.1)   | 3,820 (92.6)         | 304 (7.4)              |
| **Education**                |           |                        |                        |
| College or higher            | 22,306 (60.1) | 20,923 (93.8)        | 1,382 (6.2)            |
| High school                  | 11,575 (31.2) | 10,706 (92.5)        | 869 (7.5)              |
| Middle school or lower       | 3,209 (8.7)   | 2,970 (92.6)         | 239 (7.5)              |
| **Income**                   |           |                        |                        |
| Lowest                       | 7,277 (20.9)  | 6,774 (93.1)          | 503 (6.9)              |
| Low middle                   | 8,153 (23.4)  | 7,576 (92.9)          | 577 (7.1)              |
| High middle                  | 9,463 (27.2)  | 8,914 (94.2)          | 549 (5.8)              |
| Highest                      | 9,909 (28.5)  | 9,292 (93.8)          | 617 (6.2)              |
| **Employment status**        |           |                        |                        |
| Regular                      | 30,063 (81.0) | 28,056 (93.3)        | 2,007 (6.7)            |
| Temporary                    | 5,132 (13.8)   | 4,767 (92.9)         | 364 (7.1)              |
| Daily                        | 1,926 (5.2)    | 1,805 (93.7)         | 121 (6.3)              |
| **Occupation**               |           |                        |                        |
| Professional & managerial    | 8,797 (23.8)  | 8,249 (93.8)          | 548 (6.2)              |
| Clerical                     | 9,061 (24.5)  | 8,537 (94.0)          | 544 (6.0)              |
| Sales & service              | 7,479 (20.2)  | 6,913 (92.4)          | 566 (7.6)              |
| Manual                       | 11,664 (31.5) | 10,839 (92.9)        | 825 (7.1)              |
| **Weekly working hours**     |           |                        |                        |
| 1–34                         | 3,857 (10.4)   | 3,586 (93.0)         | 271 (7.0)              |
| 35–40                        | 18,168 (48.9) | 17,115 (94.2)        | 1,053 (5.8)            |
| 41–52                        | 10,146 (27.3) | 9,419 (92.8)         | 727 (7.2)              |
| 53–60                        | 3,647 (9.8)   | 3,355 (92.0)         | 293 (8.0)              |
| ≥ 61                         | 1,301 (3.5)    | 1,154 (88.7)         | 147 (11.3)             |
| **Shift work**               |           |                        |                        |
| No                           | 32,715 (88.2) | 30,616 (93.6)        | 2,099 (6.4)            |
| Yes                          | 4,394 (11.8)   | 4,002 (91.1)         | 391 (8.9)              |
| **Perceived risk at work**   |           |                        |                        |
| Risk (−)                     | 33,050 (89.1) | 30,906 (93.5)        | 2,144 (6.5)            |
| Risk (+)                     | 4,028 (10.9)   | 3,681 (91.4)         | 346 (8.6)              |

Values are presented as number (%: row percent).
*Patients with ≥ 6 points were considered to have sleep disturbance and those with < 6 points were considered to have normal sleep using the Minimal Insomnia Symptoms Scale (MISS).

### Table 2. Occupational injury and related factors

| Factors                        | Occupational injury (−) | Occupational injury (+) |
|--------------------------------|-------------------------|-------------------------|
| **Sleep disturbance**          |                         |                         |
| (−)                            | 34,298 (99.1)           | 322 (0.9)               |
| (+)                            | 2,433 (97.7)            | 56 (2.3)                |
| **MISS score**                 |                         |                         |
| 1Q                             | 18,264 (99.4)           | 103 (0.6)               |
| 2Q                             | 4,399 (99.3)            | 32 (0.7)                |
| 3Q                             | 8,288 (98.4)            | 137 (1.6)               |
| 4Q                             | 5,781 (98.2)            | 106 (1.8)               |
| **Difficulty falling asleep**  |                         |                         |
| (−)                            | 35,053 (99.0)           | 362 (1.0)               |
| (+)                            | 1,687 (99.1)            | 16 (0.9)                |
| **Waking up repeatedly during the sleep** |           |                         |
| (−)                            | 35,345 (99.0)           | 341 (1.0)               |
| (+)                            | 1,393 (97.4)            | 38 (2.6)                |

(continued to the next page)
The association between sleep-related symptoms and occupational injury by logistic regression analysis is shown in Table 5. The difference between participants who have difficulty in falling asleep and normal participants was insignificant in every model. Participants who wake up repeatedly during sleep were 3.28 times more often involved in occupational injury than those who do not wake up repeatedly during sleep (95% CI: 6/12
Table 3. Association between sleep disturbance and occupational injury by subgroups

| Sleep disturbance* | Total | Occupational injury (-) | Occupational injury (+) | OR (95% CI) |
|--------------------|-------|--------------------------|-------------------------|-------------|
| **Sex**            |       |                          |                         |             |
| Male (-)           | 19,743 (93.7) | 19,486 (98.7) | 256 (1.3) | 1           |
| (+)                | 1,334 (6.3) | 1,293 (96.9) | 41 (3.1) | 2.40 (1.47–3.92) |
| Female (-)         | 14,877 (92.8) | 14,812 (99.6) | 65 (0.4) | 1           |
| (+)                | 1,156 (7.2) | 1,140 (98.7) | 16 (1.4) | 3.10 (1.60–6.01) |
| **Age**            |       |                          |                         |             |
| 15–39 (-)          | 15,165 (93.9) | 15,077 (99.4) | 88 (0.6) | 1           |
| (+)                | 991 (6.1) | 961 (97.0) | 30 (3.0) | 5.30 (2.84–9.87) |
| 40–49 (-)          | 8,760 (93.4) | 8,645 (98.7) | 115 (1.3) | 1           |
| (+)                | 624 (6.6) | 617 (99.0) | 7 (1.0) | 0.79 (0.27–2.35) |
| 50–59 (-)          | 6,878 (92.3) | 6,800 (98.9) | 78 (1.1) | 1           |
| (+)                | 571 (7.7) | 562 (98.4) | 9 (1.6) | 1.43 (0.33–3.08) |
| ≥ 60 (-)           | 3,817 (92.6) | 3,777 (98.9) | 41 (1.1) | 1           |
| (+)                | 304 (7.3) | 293 (96.4) | 11 (3.6) | 3.50 (1.33–9.25) |
| **Employment status** |       |                          |                         |             |
| Regular (-)        | 28,052 (93.3) | 27,814 (99.2) | 238 (0.8) | 1           |
| (+)                | 2,004 (6.7) | 1,963 (98.0) | 41 (2.0) | 2.43 (1.49–3.96) |
| Temporary (-)      | 4,765 (92.9) | 4,729 (99.2) | 36 (0.8) | 1           |
| (+)                | 364 (7.1) | 355 (97.5) | 9 (2.5) | 3.32 (1.25–8.86) |
| Daily (-)          | 1,802 (93.7) | 1,755 (97.4) | 48 (2.6) | 1           |
| (+)                | 121 (6.3) | 114 (94.6) | 7 (5.4) | 2.12 (0.83–5.43) |
| **Occupation**     |       |                          |                         |             |
| Professional & managerial (-) | 8,249 (93.8) | 8,206 (99.5) | 43 (0.5) | 1           |
| (+)                | 545 (6.2) | 532 (97.5) | 18 (3.5) | 4.75 (1.83–12.40) |
| Clerical (-)       | 8,515 (94.0) | 8,495 (99.8) | 20 (0.2) | 1           |
| (+)                | 544 (6.0) | 541 (99.5) | 3 (0.5) | 2.18 (0.45–10.68) |
| Sales & service (-) | 7,416 (99.2) | 6,854 (99.2) | 562 (99.2) | 1           |
| (+)                | 60 (0.8) | 56 (0.8) | 4 (0.8) | 0.96 (0.33–2.83) |
| Manual (-)         | 10,835 (92.9) | 10,632 (99.2) | 203 (1.9) | 1           |
| (+)                | 825 (7.1) | 789 (95.6) | 36 (4.4) | 2.39 (1.44–3.94) |
| **Weekly working hours** |       |                          |                         |             |
| 1–34 (-)           | 3,583 (92.9) | 3,569 (99.6) | 14 (0.4) | 1           |
| (+)                | 271 (7.0) | 265 (97.6) | 7 (2.4) | 6.18 (2.08–18.35) |
| 35–40 (-)          | 17,113 (94.2) | 16,999 (99.3) | 114 (0.7) | 1           |
| (+)                | 1,053 (5.8) | 1,040 (98.8) | 12 (1.2) | 1.77 (0.85–3.70) |
| 41–52 (-)          | 9,414 (92.8) | 9,393 (99.0) | 92 (1.0) | 1           |
| (+)                | 725 (7.2) | 706 (97.4) | 19 (2.6) | 2.71 (1.27–5.77) |
| 53–60 (-)          | 3,355 (92.0) | 3,288 (98.0) | 67 (2.0) | 1           |
| (+)                | 293 (8.0) | 283 (96.5) | 10 (3.5) | 1.77 (0.71–4.40) |
| ≥ 61 (-)           | 1,154 (88.7) | 1,120 (97.1) | 34 (2.9) | 1           |
| (+)                | 147 (11.3) | 139 (94.3) | 8 (5.7) | 2.01 (0.66–6.13) |
| **Shift work**     |       |                          |                         |             |
| No (-)             | 30,608 (93.6) | 30,324 (99.1) | 284 (0.9) | 1           |
| (+)                | 2,096 (6.4) | 2,055 (98.0) | 41 (2.0) | 2.15 (1.36–3.39) |
| Yes (-)            | 4,002 (91.0) | 3,967 (99.1) | 35 (0.9) | 1           |
| (+)                | 391 (8.9) | 378 (96.6) | 13 (3.4) | 3.96 (1.61–9.75) |
| **Company size**   |       |                          |                         |             |
| 1–4 (-)            | 6,732 (92.5) | 6,681 (99.2) | 51 (0.8) | 1           |
| (+)                | 542 (7.5) | 536 (98.9) | 6 (1.1) | 1.48 (0.45–4.84) |
| 5–49 (-)           | 16,150 (93.2) | 15,985 (99.0) | 165 (1.0) | 1           |
| (+)                | 1,175 (6.8) | 1,143 (97.2) | 33 (2.8) | 2.76 (1.64–4.65) |
| 50–499 (-)         | 6,927 (93.7) | 6,868 (99.1) | 59 (0.9) | 1           |
| (+)                | 462 (6.3) | 455 (98.4) | 8 (1.6) | 1.92 (0.67–5.51) |
| ≥ 500 (-)          | 4,575 (94.4) | 4,537 (99.2) | 39 (0.8) | 1           |
| (+)                | 271 (5.6) | 262 (96.7) | 9 (33.0) | 4.01 (1.28–12.53) |

ORs are estimated by univariable logistic regression analysis.
OR: odds ratio; CI: confidence interval.
*Patients with ≥ 6 points were considered to have sleep disturbance and those with < 6 points were considered to have normal sleep using the Minimal Insomnia Symptoms Scale (MISS).
Participants who wake up with a feeling of exhaustion and fatigue were 2.64 times more often involved in occupational injury than participants who do not wake up with a feeling of exhaustion and fatigue (95% CI: 1.69–4.11).

**DISCUSSION**

This study explored the association between sleep disturbance and occupational injury using nationwide data representative of Korean working population. When adjusted for age, sex, education level, income, occupation, employment status, shift work, working hours and perceived risk at work, the OR for occupational injury among participants who have experienced sleep disturbance was higher than normal participants (OR: 2.57; 95% CI: 1.68–3.93). When adjusted as above, the ORs of MISS score for occupational injury gradually increased from the first to the fourth quartile. Participants who had sleep disturbance had higher odds of suffering occupational injuries for the symptom “Waking up repeatedly during sleep” (OR: 3.28; 95% CI: 1.92–5.62). Participants who wake up with a feeling of exhaustion and fatigue were 2.64 times more often involved in occupational injury than participants who do not wake up with a feeling of exhaustion and fatigue (95% CI: 1.69–4.11).
weekly was high is considered to be because they may not be familiar with their work. Our findings suggest that sleep disturbances and each of sleep-related symptoms are associated with the occurrence of occupational injuries.

Both of the symptoms “Difficulty falling asleep” and “Waking up repeatedly during sleep” affects to the occurrence of occupational injury although it is plausible that the influence of the latter symptom is stronger than the former symptom, that suggests that the progress of sleep is more important than the beginning of sleep. The symptom “Waking up with a feeling of exhaustion and fatigue” might be the result of two symptoms mentioned above since the OR for this symptom is between the ORs for other symptoms.

Several possible mechanism can explain the effect of sleep disturbance on occupational injury. Sleep disturbance results in cognitive decline and slows reaction time which is crucial for completing tasks and solving problems. Consequently, poor sleep health influence lowers decision-making function, and increases mistakes during the job which leads to resultant accidents and errors in workplace.

The finding of this study that sleep disturbance is related to occupational injury is consistent with the findings of previous studies. A systemic review and meta-analysis that analyzed 27 studies also concluded that sleep problems increase the risk of being injured at work by 62% (RR: 1.62; 95% CI: 1.43-1.84). A cohort study investigated the role of sleep disturbances in occupational injury among Swedish women reported persistent insomnia increased risk of occupational accident. Several reviews have reported that obstructive sleep apnea, sleepiness and hypersomnia increased the risk of work-related traffic accidents among commercial drivers. It was reported that in cases of professional driving jobs, crashes were more likely with longer working hours, which occur because of lack of sleep or rest and poor working conditions. Drowsy driving accounts for approximately 25 percent of all traffic accidents.

The result of this study and previous studies suggest intervention program for workers’ sleep-related problems and fatigue may be helpful to reduce occupational injuries. For instance, fatigue risk management system (FRMS) is employed in sectors related serious result when accidents occur, such as public transportation and aviation. Also intervention program for sleep apnea among drivers can reduce drowsy driving and traffic accidents. A randomized clinical trial in 2017 reported firefighters who had completed sleep disorders screening and joined education sessions reported 46% fewer disability days than control group. Effective intervention programs for sleep disturbance related accidents and injuries should be developed in the future.

This study has several strengths. First, this study contributes to the existing knowledge base of the association between sleep disturbance and occupational injury using nationally representative sample. There was no large-scale study applying validated questionnaire tools to assess sleep disturbance on this topic in Korea. Second, in subgroup analysis, we observed that participants having sleep disturbance showed higher OR for occupational injury than normal participants in most subgroups. Third, the higher the MISS score was, the higher the OR for occupational injury was observed regardless of adjustment.

This study has several limitations. First, this study was a cross-sectional study. Causal relationship could not be established although the positive association between sleep disturbance and occupational injury was observed. Second, other aspects of sleep...
DISTURBANCES WERE NOT INVESTIGATED IN 5TH KWCS, INCLUDING DAYTIME SLEEPINESS, SLEEP DEBT, AND POOR SLEEP QUALITY. THIRD, IT IS NOT CLEAR ABOUT THE SEVERITY OR TYPE OF OCCUPATIONAL INJURY BECAUSE THERE IS NO SUCH QUESTION IN THE 5TH KWCS.

CONCLUSIONS

This study not only observed an association between sleep disturbance and occupational injury but also found that the higher MISS score, the higher the risk of occupational injury. Prospective cohort study or intervention studies will be necessary in the future. In addition, it is necessary to prevent occupational injury by introducing intervention programs to manage sleep disturbance and fatigue.

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