Prevalence of insomnia symptoms and predictive factors among employees at central government

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Abstract. Insomnia can be experienced by employees in both the private sector and the government. Central government agencies play important technical, administrative, and analytical roles in government affairs, such as national assets and important documents. The purpose of this study was to determine the prevalence of insomnia symptoms and factors significantly associated with these symptoms in employees at central government agencies in Jakarta. The present study design was cross-sectional, involving 224 respondents, and data retrieval used questionnaires to determine an insomnia rating scale. Other data collection methods included questionnaire characteristics of the respondents, stress diagnostic survey, self-reporting questionnaire 20, and a heart rate variability analyzer SA 3000P. In the staff offices of central government agencies, the prevalence of insomnia symptoms reached 50%, comprising 44.2% with mild insomnia and 5.8% with moderate insomnia symptoms. In this study, factors with a significant relationship included structural position [odds ratio (OR) 0.64; 95% confidence interval (CI) 0.41–0.98], stressor qualitative work overload medium–heavy (OR 2.50; 95% CI 1.02–6.10), and presence of emotional mental disorders (OR 2.76; 95% CI 1.20–6.36). Our study revealed a high prevalence of insomnia symptoms in office employees of central government agencies in Jakarta.

1. Introduction

Sleep is one of the most important factors to maintain good health, and humans spend one-third of their life time asleep. Disrupted sleep can have negative effects on quality of life. For many, sleeping is easy; however, some people find this a difficult task. This difficulty sleeping is known as insomnia [1].

The prevalence of insomnia varies and depends on the classification of insomnia used in epidemiological studies. Around 30% of adults suffer from insomnia, and 10% of these experience severe insomnia. Insomnia has a huge impact on the quality of life, as poor quality of sleep lowers...
quality of life [2]. Nearly one-third of adults in America report difficulty falling asleep and/or staying asleep, with 17% of these reporting this as being significant [3,4].

A study conducted in Japan by Yoshioka et al. found that around 24.7% of employees at local government offices experienced insomnia and that this was significantly associated with factors including working hours, education level, work stress, and long working hours using a visual display terminal (VDT) [5]. A study by Utsugi et al. showed that work stress was a possible risk factor for insomnia [6]. In addition, Robiana et al. showed that emotional mental disorders had an effect on insomnia [7].

Afrianti et al. showed that 42.9% of firefighters in Jakarta experienced insomnia, of whom 34% suffered mild insomnia and 8.9% suffered moderate insomnia [8]. A study by Rifai et al. on shift workers at oil and gas companies found that 54.3% of afternoon shift workers and 76.1% of night shift workers experienced insomnia [9].

To date, there have been no studies related to insomnia among either private or government employees in Indonesia. Central government agencies play important technical, administrative, and analytical roles in government affairs, such as national assets and inventories, important documents including those relating to unresolved criminal cases, and protocols, for example, ceremonial flag honor. Insomnia can disrupt the performance of employees with important responsibilities and may consequently be detrimental nationally, for example, as a result of a technical error such as a mistake in an asset inventory or losing important documents. In addition, changes to work culture, such as promoting the motto “work, work, and work” by the Elected President, also means employees have had to adapt to different working pressures. This study was conducted simultaneously with the study Work Stress Difference with Autonomous Disorder and Work Stressor Type among User and Non-User of VDT Employees at Government Institution.

2. Methods
This study was cross-sectional in design and used a questionnaire consisting of an insomnia rating scale (IRS) questionnaire, respondents’ characteristic questionnaire, survey diagnostic stress (SDS) questionnaire, self-reporting questionnaire 20 (SRQ-20), and examination of heart rate variability (HRV) using an HRV analyzer SA 3000 P to detect autonomous disorders. The study was conducted at the central government office at Jalan Veteran, Central Jakarta. Data were collected immediately following approval from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Indonesia-Dr. Cipto Mangunkusumo Hospital.

Participants comprised those who met the inclusion criteria of a minimum work experience of 12 months, minimum education of diploma, willing to be included in the study, and those who gave written consent. Exclusion criteria were pregnant women and employees with a history of heart disease, stroke, and severe mental disorders obtained from visit history data from the office polyclinic and MCU data in 2015.

Multivariate analysis was used to identify factors with a significant relationship to insomnia symptoms among the respondents of this study; therefore, this study required a sample size 10 times that of each variable studied. In this study, there were 22 variables; therefore, the number of samples needed was $10 \times 22 = 220$ respondents.

Determination of the population was carried out simultaneously with the study of Work Stress Difference with Autonomous Disorder and Work Stressor Type among User and Non-User of VDT Employees at Government Institution. Of 1046 employees at the central government agencies, cluster random sampling of five areas or clusters was used to select the location of the research subject, resulting in cluster A and B with a total of 606 employees in both areas. Afterward, 336 participants with an education level of diploma, bachelor, masters, and doctoral graduate were obtained from data from the personnel department. The minimum sample required for this study was 106 respondents, and there were 224 employees who met the inclusion criteria after sampling. All employees selected to be
respondents agreed to be included in the study and gave written signed consent. Data were collected by interview and secondary data of employment and attendance.

The data obtained were analyzed using Statistical Package for the Social Sciences version 20. Univariate analysis was used to determine the distribution of all independent variables. Bivariate analysis was performed using Chi-Square test to observe the relation of independent and dependent variables (insomnia symptom). Multivariate analysis in the form of logistic regression was performed for variables with a correlation significance value of $p < 0.25$ to observe the dominant factors that affect insomnia.

### 3. Results

The measurement results performed on cluster areas A and B indicated that the average temperature, humidity, lighting, and noise levels represented good office working standards for both cluster areas.

**Table 1.** Results of the working environment measurements.

| Work area | Temperature (°C) | Humidity (%) | Lighting (lux) | Noise (dB) |
|-----------|------------------|--------------|----------------|------------|
| Area A    |                  |              |                |            |
| 1st floor | 24.1             | 57           | 230            | 51.2       |
| 2nd floor | 24.0             | 51           | 235            | 49.7       |
| 3rd floor | 25.1             | 55           | 258            | 50.1       |
| Area B    |                  |              |                |            |
| Ground floor | 26.0              | 54           | 262            | 53         |
| 1st floor | 26.0             | 50           | 237            | 49         |
| 2nd floor | 26.4             | 52           | 314            | 47.6       |
| 3rd floor | 25.1             | 51           | 231            | 45.8       |
| 4th floor | 25.1             | 47           | 365            | 46.5       |

Table 1 shows that the average temperature measurement of 25.2 °C (digital thermometer) was in accordance with Indonesian Minister of Health Regulation for good room temperature (18 °C to 28 °C). Measurements of air humidity (digital thermometer) ranged from 47% to 57%, with an average of 52.1%, in accordance with the Indonesian Minister of Health Regulation good humidity range from 40% to 60%. The lighting measurement ranged from 230 to 365 lux, with an average of 266.5 lux. This was also in accordance with Indonesian Minister of Health Regulation minimal lighting requirement of 100 lux. The noise measurement ranged from 45.8 to 53 dB, with an average of 49.1 dB, and also represented good conditions based on a standard of <60 dB for office noise.

**Table 2.** Distribution of respondents according to prevalence of insomnia symptoms

| Variables      | n  | (%) |
|----------------|----|-----|
| No insomnia    | 112| 50  |
| Insomnia       |    |     |
| Mild insomnia  | 99 | 44.2|
| Moderate insomnia | 13 | 5.8 |
| Severe insomnia| 0  | 0   |

Diagnosis of insomnia symptoms was based on an IRS questionnaire standardized by the Psychiatric Study Group, Biology Jakarta (KSPBJ–IRS) by adding a score to each of eight available questions (Table 2). Of the total 224 respondents, 112 (50%) experienced insomnia symptoms. The highest incidence rate experienced mild insomnia (44.2%), while no respondents experienced severe insomnia.
Table 3. Sociodemographic factors associated with insomnia symptoms

| Variables               | Insomnia | No Insomnia | OR   | 95% CI   | p-value |
|-------------------------|----------|-------------|------|----------|---------|
|                         | n = 112 | n = 112     |      | Min      | Max     |         |
| Age                     |          |             |      |          |         |         |
| >40 years               | 30       | 26.8        | 43   | 38.4     | 0.59    | 0.33    | 1.03    | 0.064   |
| ≤40 years               | 82       | 73.2        | 69   | 61.6     | Ref.    |         |         |         |
| Gender                  |          |             |      |          |         |         |         |         |
| Female                  | 64       | 57.1        | 56   | 50       | 1.33    | 0.79    | 2.26    | 0.284   |
| Male                    | 48       | 42.9        | 56   | 50       | Ref.    |         |         |         |
| Marital status          |          |             |      |          |         |         |         |         |
| Married                 | 92       | 82.1        | 94   | 83.9     | 0.88    | 0.44    | 1.77    | 0.722   |
| Single                  | 20       | 17.9        | 18   | 16.1     | Ref.    |         |         |         |
| Educational degree      |          |             |      |          |         |         |         |         |
| Bachelor                | 82       | 73.2        | 89   | 79.5     | 0.71    | 0.38    | 1.31    | 0.271   |
| Non-bachelor            | 30       | 26.8        | 23   | 20.5     | Ref.    |         |         |         |
| Income                  |          |             |      |          |         |         |         |         |
| >6 million              | 95       | 84.8        | 99   | 88.4     | 0.73    | 0.34    | 1.59    | 0.433   |
| ≤6 million              | 17       | 15.2        | 13   | 11.6     | Ref.    |         |         |         |
| Employment status       |          |             |      |          |         |         |         |         |
| Non-government employee | 3       | 2.7         | 3    | 2.7      | 1.00    | 0.20    | 5.06    | 1.000   |
| Government employee     | 109      | 97.3        | 109  | 97.3     | Ref.    |         |         |         |

Sociodemographic factors showed no significant association with insomnia (p > 0.05)

Table 4. Work-related factors associated with insomnia symptoms

| Variable                                | Insomnia | Non-insomnia | OR   | 95% CI   | p-value |
|-----------------------------------------|----------|--------------|------|----------|---------|
|                                        | n = 112 | n = 112      |      | Min      | Max     |         |
| Work experience                         |          |              |      |          |         |         |
| >5 years                                | 94       | 83.9         | 94   | 83.9     | 1.00    | 0.49    | 2.04    | 1.000   |
| ≤5 years                                | 18       | 16.1         | 18   | 16.1     | Ref.    |         |         |         |
| Working hours/week                      |          |              |      |          |         |         |         |         |
| >40 h                                   | 54       | 48.2         | 48   | 42.9     | 1.24    | 0.73    | 2.10    | 0.421   |
| ≤40 h                                   | 58       | 51.8         | 64   | 57.1     | Ref.    |         |         |         |
| Working hours using computer            |          |              |      |          |         |         |         |         |
| ≥4 h                                    | 65       | 58.0         | 50   | 44.6     | 1.72    | 1.01    | 2.91    | 0.045*  |
| <4 h                                    | 47       | 42.0         | 62   | 55.4     | Ref.    |         |         |         |
| Orientation/training/refresher course using computer | No | 73 | 65.2 | 63 | 56.3 | 1.46 | 0.85 | 2.50 | 0.171 |
|                                        | Yes      | 39           | 34.8 | 49 | 43.8 | 1.46 | 0.85 | 2.50 | 0.171 |
| Comfortable while using computer        |          |              |      |          |         |         |         |         |
| No                                      | 0        | 0            | 0    | 0        |         |         |         |         |
| Yes                                     | 112      | 100          | 112  | 100      | Cannot be assessed |         |         |         |
| Use of VDT outside work                 |          |              |      |          |         |         |         |         |
| >6 h                                    | 73       | 65.2         | 58   | 51.8     | 1.74    | 1.02    | 2.98    | 0.042*  |
| ≤6 h                                    | 39       | 34.8         | 54   | 48.2     | Ref.    |         |         |         |
| Position                                |          |              |      |          |         |         |         |         |
| Structural                             | 38       | 33.9         | 64   | 57.1     | 0.59    | 0.26    | 1.35    | 0.211   |
| General functional                     | 59       | 52.7         | 33   | 29.5     | 1.79    | 0.78    | 4.11    | 0.169   |
| Specific functional                    | 15       | 13.4         | 15   | 13.4     | Ref.    |         |         |         |
| HRV                                     |          |              |      |          |         |         |         |         |
| Autonomic disorder (+)                 | 23       | 20.5         | 13   | 11.6     | 1.97    | 0.94    | 4.12    | 0.069   |
| Autonomic disorder (−)                 | 89       | 79.5         | 99   | 88.4     | Ref.    |         |         |         |
| SRQ-20                                  |          |              |      |          |         |         |         |         |
| Emotional mental disorder (+)          | 29       | 25.9         | 10   | 8.9      | 3.56    | 1.64    | 7.74    | 0.001*  |
| Emotional mental disorder (−)          | 83       | 74.1         | 102  | 91.1     | Ref.    |         |         |         |

*p<0.05
Work-related factors associated with insomnia symptoms showed a significant difference for the number of working hours with computers (p = 0.045), use of a VDT outside work (p = 0.042), and SRQ-20 questionnaire or emotional mental disorders (p = 0.001) (Table 3). Respondents using a computer for ≥4 h had a 1.72-fold higher risk of experiencing insomnia symptoms (OR = 1.72; 95% CI = 1.01–2.91) compared with those who used computers for <4 h. Those using VDTs outside of work for ≥6 h had a 1.74-fold increased risk of experiencing insomnia symptoms (OR = 1.74; 95% CI = 1.02–2.98) compared with those who used a VDT outside work for <6 h. Respondents who experienced an emotional mental disorder had a 3.56-fold higher risk of experiencing insomnia symptoms (OR = 3.56; 95% CI = 1.64–7.74) than those who did not experience an emotional mental disorder (Table 4).

For occupational stressors associated with insomnia symptoms, there was a significant difference for qualitative work overload (p = 0.003). Respondents with a greater qualitative work overload stressor had a 2.56-fold higher risk of experiencing insomnia (OR = 2.56; 95% CI = 1.38–4.75) compared with those without a qualitative work overload stressor (Table 5).

A multivariate analysis with regression binary logistic was performed to observe factors related to insomnia symptoms. The results of the multivariate analysis shown in Table 6 indicate a significant difference for structural position (p = 0.038), emotional mental disorder (p = 0.017), and qualitative work overload stressor (p = 0.045), showing that these factors played a significant role in the occurrence of insomnia symptoms among employees at the central government agencies in Jakarta (Table 6).

Respondents with structural positions experienced insomnia symptoms 36% times lower (OR = 0.64, 95% CI = 0.41–0.98) than those with specific functional positions, suggesting this may be a
prevention factor. For SRQ-20 variables, respondents who experienced an emotional mental disorder had a 2.76-fold higher risk (OR = 2.76, 95% CI = 1.20–6.36) of experiencing insomnia symptoms than those who did not experience emotional mental disorders. In the type of stressors, respondents with a qualitative work overload stressor had a 2.50-fold higher risk of experiencing insomnia symptoms (OR = 2.50; 95% CI = 1.02–6.10) than respondents without. This multivariate analysis showed $R^2 = 0.125$, indicating that this study included 12.5% factors associated with the occurrence of insomnia symptoms, and a further 87.5% that remain to be determined in future studies.

Table 6. Multivariate analysis of factors associated with insomnia symptoms

| Variable                                      | OR adj | 95% CI | p-value |
|-----------------------------------------------|--------|--------|---------|
| Age >40 years                                  | 0.94   | 0.49   | 1.80    | 0.856 |
| Working hours using computer for ≥4 h          | 0.67   | 0.37   | 1.19    | 0.171 |
| Orientation/training/refresher course using computer (yes) | 1.30   | 0.72   | 2.34    | 0.386 |
| Use of VDT outside work for >6 h              | 1.43   | 0.80   | 2.58    | 0.229 |
| Structural position                           | 0.64   | 0.41   | 0.98    | 0.038*|
| Autonomic disorder (+)                        | 1.51   | 0.68   | 3.37    | 0.314 |
| Emotional mental disorder (+)                 | 2.76   | 1.20   | 6.36    | 0.017*|
| Role conflict stressor                        | 0.89   | 0.44   | 1.82    | 0.755 |
| Quantitative work overload stressor           | 0.89   | 0.41   | 1.97    | 0.778 |
| Qualitative work overload stressor            | 2.50   | 1.02   | 6.10    | 0.045*|
| Career development stressor                   | 0.83   | 0.42   | 1.66    | 0.596 |
| Constant                                      | 0.81   |        |         | 0.676 |

$R^2 = 0.125$; *p<0.05

4. Discussion
Conformity of the working environment consisted of measuring temperature, humidity, lighting, and noise [10]. Measurement of temperature, air humidity, lighting, and noise showed that in clusters A and B the average temperature (25.2 °C), air humidity (52.1%), lighting (266.5 lux), and noise (49.1 dB) represented good standard conditions for the work office environment because they met the requirements of regulations in Indonesia, such as those stated in Indonesian Minister of Health Regulation no. 1405/MENKES/SK/XI/2002 [10].

The prevalence of insomnia symptoms in central government office employees reached 50%, comprising 44.2% with mild insomnia and 5.8% with moderate insomnia. In the present study, no employees at the central government office suffered from severe insomnia. Diagnosis of insomnia symptoms was based on the IRS developed by the Psychiatric Study Group, Biology Jakarta. This result was slightly higher than that described by Afrianti et al., who reported that the prevalence of insomnia in firefighters who also used the IRS questionnaire reached only 42.9% [8]. The general prevalence of insomnia in adults was 30% in most studies [3,4]. These differences in prevalence were due to differences in working hours, occupational stress, workload conditions, computer/VDT use in work, total working hours per week, and emotional mental disorders of each study respondents.

The prevalence of insomnia itself varies among each company or office depending on the type of work, occupational stress, work environment, or the existing pattern of work. Previous studies showed a correlation between working and sleep disorders.

It was encouraging that the majority of employees only experienced mild insomnia symptoms (88.4%) as this is easier to overcome than moderate insomnia (11.6%).

Currently, evaluation of employees’ health in government agencies only consists of an annual routine medical check-up. If the respondents felt sick, they could be seen at a clinic for employees provided at the office. It is best to evaluate the health of employees experiencing insomnia symptoms within a period of one to three months to assess whether it improves or gets worse. Employees experiencing moderate insomnia symptoms should consult a doctor for the necessary treatment.
Yoshioka et al. showed that there was a significant relationship between a person’s occupational position and insomnia [11]. This study showed significant relationship with OR 0.650 (0.42–0.99), and 52.7% of participants who experienced insomnia symptoms generally had functional positions. A person’s occupational position plays a role in their socioeconomic status and income.

The use of computers and VDTs has become routine in offices. The existence of VDTs increased rapidly, with an estimated 40–80 million users in the 1990s. Use of VDTs is often associated with eye tension, musculoskeletal symptoms, and headaches. VDTs are also associated with sleep disorders, with reports of difficulty falling asleep and waking up at night. In 2008, Yoshioka et al. showed that use of a VDT for more than 6 h was associated with insomnia [12]. The presence of sleep disorders not only causes various diseases but also results in reduced productivity [13].

Stress can affect sleep both physically and mentally. Stress may come from the workplace and is a precipitation factor that acts as a cause of insomnia [14]. Psychological stress can be an important factor that disrupts sleep. However, the presence of individual factors also has an important influence [15]. Utsugi et al. and Robaina et al. showed that work stress and emotional mental disorders were associated with insomnia and short sleep duration [6,7]. Their studies showed that work stress (as measured by SDS questionnaire) had no significant relationship with insomnia symptoms; however, of the six measured stressors affecting work stress, qualitative work overload showed a significant relationship. In addition, in this study, emotional mental disorders also associated with insomnia symptoms. Further evaluation of occupational stress is necessary. Furthermore, this study was only conducted at a specific time point, and long-term monitoring of occupational stress may be required.

In the present study, occupational position, qualitative work overload stressor, and emotional mental disorder showed a significant relationship with occurrence of insomnia symptoms among the employees at the central government agencies (p = 0.038 for occupational position, p = 0.045 for qualitative work overload stressor, and p = 0.017 for emotional mental disorder factors).

Respondents with structural positions showed 36% times lower experience of insomnia symptoms (OR = 0.64, 95% CI = 0.41–0.98) compared with those who had specific functional positions. For SRQ-20 variables, respondents who experienced an emotional mental disorder had a 2.76-fold higher risk (OR = 2.76, 95% CI = 1.20–6.36) of experiencing insomnia symptoms than those who did not. In the type of stressors, respondents with a qualitative work overload stressor had a 2.50-fold higher risk of experiencing insomnia symptoms (OR = 2.50; 95% CI = 1.02–6.10) than those who did not. This multivariate analysis showed $R^2 = 0.125$, suggesting that this study included 12.5% factors associated with the occurrence of insomnia symptoms, leaving 87.5% other factors that remain to be identified in future studies.

This study had several limitations. First, the factors related to this cross-sectional design were not as strong as the analytic research design. Second, this study was not directly observed as it only measured the respondents’ answer and used approximate time units such as hours and years. Third, it did not include a physical examination or disease history of the respondents. Fourth, respondents’ habits that may affect insomnia (e.g., coffee and alcohol consumption) were not determined.

However, this study also had several advantages, such as the design of this study was able to determine prevalence and factors with a significant relationship to insomnia. Furthermore, this study was the first to observe the prevalence of insomnia symptoms among employees at central government agencies in Indonesia. This study examined factors related to work, not only using the SDS questionnaire but also via objective examination with HRV tools to determine autonomous disorders as well as emotional mental disorders using the SRQ-20 questionnaire that may also contribute to insomnia symptoms.

5. Conclusions
The prevalence of insomnia among employees at central government offices reached 50%, comprising 44.2% suffering from mild insomnia and 5.8% suffering from moderate insomnia. The working environment of the respondents of this study was comfortable as it met the acceptable standards.
required in Indonesia. This study found that occupational position, qualitative work overload, and emotional mental disorders were significantly related with the occurrence of insomnia symptoms among employees at central government agencies.

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