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RESEARCH ARTICLE

# Occupational stress and fatigue as risk factors for hypertension among employees at PT. Perkebunan Milano, Kebun Sei Daun

Eva Ellya Sibagariang[1], Jesika Meyanti Saragih[2]*, Hartono[1]

**ABSTRACT**

**Background:** Hypertension is a major public health problem with increasing prevalence and is a primary risk factor for various cardiovascular diseases. Workers exposed to work stress and work fatigue are at higher risk. This study aimed to determine the relationship between work stress and work fatigue with the incidence of hypertension among employees at PT. Milano Kebun Sei Daun.
**Method:** This quantitative study used a cross-sectional design. The population comprised all 52 employees, and total sampling was used to include all as respondents. Data were collected using questionnaires, observation sheets, and blood pressure measurements. Univariate analysis described frequency distributions, and bivariate analysis used the chi-square test ($\alpha$=0.05).
**Results:** The study found that 14 respondents (26.9%) had hypertension. Among those with high work stress, 2 had hypertension; among those with high work fatigue, 3 had hypertension. Chi-square tests showed significant associations between work stress and hypertension ($p$=0.044) and between work fatigue and hypertension ($p$<0.001).
**Conclusion:** There are significant relationships between work stress and work fatigue with the incidence of hypertension among employees at PT. Milano Kebun Sei Daun. Workplace interventions to reduce stress and fatigue are recommended.

**Keywords:** work stress, work fatigue, hypertension, employees

## Introduction

Hypertension is one of the most prevalent public health problems worldwide, with its prevalence continuing to rise annually. It serves as a major risk factor for various cardiovascular diseases, including stroke, heart failure, and kidney disorders.[1] Hypertension often presents without characteristic symptoms, but if uncontrolled, it can lead to serious complications that significantly reduce quality of life and increase mortality.[2] One high-risk group for hypertension is workers, particularly those exposed to work stress and work fatigue in their daily activities.[3,4]

Work stress occurs when job demands are not balanced with an individual's ability to cope with them.[5] Work fatigue arises from excessive physical or mental workload combined with insufficient recovery time.[6] Both conditions can trigger increased sympathetic nervous system activity, which raises blood pressure. In high-pressure work environments, these conditions potentially increase the risk of hypertension among employees.[7,8]

**Affiliation**
[1]Department of Public Health, Universitas Prima Indonesia
[2]Undergraduate Program in Public Health, Universitas Prima Indonesia

**Corespondence:**
jesikameyantisaragih@gmail.com

PT. Perkebunan Milano Kebun Sei Daun employs workers in various roles, including security guards (satpam), office staff, and maintenance personnel. Security guards face demands for 24-hour vigilance, shift work systems, conflict risks, and responsibility for workplace security.[9] Office staff experience target pressures, administrative burdens, and monotonous work with low physical activity.[10] Maintenance workers face high job demands, pressure to complete tasks quickly, and work environments requiring high precision and concentration. These conditions can lead to prolonged work stress and fatigue, activating the sympathetic nervous system and increasing stress hormones such as adrenaline and cortisol, which raise heart rate and cause vasoconstriction, ultimately increasing blood pressure.[9,11]

Previous research has demonstrated significant relationships between work stress and hypertension among police officers in Riau[12] and among firefighters in Banda Aceh[13]. Similarly, studies have shown associations between work fatigue and hypertension among workers at Wedusan Market in Probolinggo.[14] Based on these findings, this study aimed to analyze the relationship between work stress and work fatigue with the incidence of hypertension among employees at PT. Perkebunan Milano Kebun Sei Daun. The results are expected to inform prevention and control efforts for hypertension risk factors in the workplace.

## Method

This was a quantitative study using a cross-sectional design, which measures independent and dependent variables simultaneously at a single time point. The study aimed to determine the relationship between work stress and work fatigue with the incidence of hypertension among employees. The study was conducted at PT. Perkebunan Milano Kebun Sei Daun, North Sumatra, in March 2026. The population comprised all 52 employees of PT. Perkebunan Milano Kebun Sei Daun. Total sampling was used, meaning all 52 employees were included as respondents.

Data were collected using questionnaires, observation sheets, and direct blood pressure measurements. The questionnaire assessed work stress levels and work fatigue levels. Blood pressure was measured using a calibrated sphygmomanometer to determine hypertension status.

Work stress was defined as an imbalance between job demands and individual coping abilities, categorized as high stress, moderate stress, or low stress based on questionnaire scores. Work fatigue was defined as a condition of reduced physical and mental efficiency due to prolonged work activity, categorized as high fatigue, moderate fatigue, or low fatigue. Hypertension was defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg based on direct measurement, categorized as hypertensive or normal.

Univariate analysis was performed to describe the frequency distribution of each variable (age, sex, work stress level, work fatigue level, hypertension status). Bivariate analysis used the chi-square test ($\alpha$=0.05) to examine associations between work stress and hypertension, and between work fatigue and hypertension. Results were presented in frequency distribution tables and cross-tabulations.

## Results

A total of 52 employees participated in the study. Table 1 shows the distribution of respondents by age. The majority were aged 31-40 years (19 respondents, 36.5%), followed by ages 20-30 years (16, 30.8%), ages 41-50 years (11, 21.2%), and age >51 years (6, 11.5%). This indicates that most respondents were in productive adult age groups. The majority were male (32 respondents, 61.5%), while female respondents numbered 20 (38.5%).

Table 1. Distribution of respondents by age and gender (N=52)

| Characteristic | Frequency (n) | Percentage (%) |
|---|---|---|
| Age group (years) | | |
| 20-30 | 16 | 30.8 |
| 31-40 | 19 | 36.5 |
| 41-50 | 11 | 21.2 |
| >51 | 6 | 11.5 |
| Gender | | |
| Male | 32 | 61.5 |
| Female | 20 | 38.5 |

Table 2 presents the frequency distributions for work stress, work fatigue, and hypertension status. For work stress, the majority had low stress (31 respondents, 59.6%), followed by moderate stress (16, 30.8%)

and high stress (5, 9.6%). For work fatigue, the majority had low fatigue (37 respondents, 71.2%), followed by moderate fatigue (10, 19.2%) and high fatigue (5, 9.6%). For hypertension status, 38 respondents (73.1%) had normal blood pressure, while 14 (26.9%) were hypertensive.

Table 2. Distribution of work stress, work fatigue, and hypertension (N=52)

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Work stress | Low | 31 | 59.6 |
| | Moderate | 16 | 30.8 |
| | High | 5 | 9.6 |
| Work fatigue | Low | 37 | 71.2 |
| | Moderate | 10 | 19.2 |
| | High | 5 | 9.6 |
| Hypertension | Normal | 38 | 73.1 |
| | Hypertensive | 14 | 26.9 |

The chi-square test showed a significant association between work stress and hypertension (p = 0.044). Among the 5 respondents with high work stress, 2 (40.0%) had hypertension. Among those with moderate stress, 6 (37.5%) had hypertension, and among those with low stress, 6 (19.4%) had hypertension (Table 3).

Table 3. Association between work stress and hypertension (N=52)

| Work stress | Normal BP n (%) | Hypertension n (%) | Total | p-value |
|---|---|---|---|---|
| Low | 25 (80.6) | 6 (19.4) | 31 | 0.044 |
| Moderate | 10 (62.5) | 6 (37.5) | 16 | |
| High | 3 (60.0) | 2 (40.0) | 5 | |

The chi-square test showed a significant association between work fatigue and hypertension (p < 0.001). Among the 5 respondents with high work fatigue, 3 (60.0%) had hypertension. Among those with moderate fatigue, 4 (40.0%) had hypertension, and among those with low fatigue, 7 (18.9%) had hypertension (Table 4).

Table 4. Association between work fatigue and hypertension (N=52)

| Work fatigue | Normal BP n (%) | Hypertension n (%) | Total | p-value |
|---|---|---|---|---|
| Low | 30 (81.1) | 7 (18.9) | 37 | <0.001 |
| Moderate | 6 (60.0) | 4 (40.0) | 10 | |
| High | 2 (40.0) | 3 (60.0) | 5 | |

## Discussion

The study found a significant association between work stress and hypertension (p=0.044). This finding is consistent with the physiological mechanism whereby prolonged work stress activates the sympathetic nervous system and increases stress hormones such as adrenaline and cortisol. These hormones increase heart rate and cause vasoconstriction, leading to sustained blood pressure elevation and eventually hypertension.[15] Workers in different roles experience stress differently: security guards face 24-hour vigilance demands and shift work; office staff face target pressures and administrative burdens; maintenance workers face high demands for precision and quick task completion. These conditions can lead to chronic work stress.[9] This result aligns with previous research among police officers in Riau[12] and firefighters in Banda Aceh[13], both of which found significant associations between work stress and hypertension (p<0.05).

The study also found a significant association between work fatigue and hypertension (p<0.001). Work fatigue occurs when physical and mental workloads exceed recovery capacity.[16] Security guards often work long hours with shift systems that disrupt rest and sleep patterns.[17] Office staff experience fatigue from work pressure, targets, and prolonged sitting.[18] Maintenance workers face high physical demands and continuous concentration requirements. These conditions cause the body and mind to work excessively, leading to physical and mental stress.[19] Prolonged work fatigue increases heart rate and blood pressure through sustained elevation of stress hormones. Additionally, insufficient rest and poor sleep quality further increase hypertension risk.[20] This finding is supported by research among workers at Wedusan Market, Probolinggo, which found a significant relationship between work fatigue and hypertension.[14]

This study has several strengths, including the use of total sampling (all employees included) and direct blood pressure measurement rather than self-reported diagnosis. However, several limitations must be acknowledged. The cross-sectional design precludes causal inference; associations may be bidirectional.

Data on work stress and fatigue relied on self-reported questionnaires, which are subject to recall and social desirability bias. The small sample size (n=52) and single workplace setting limit generalizability to other populations. The study did not assess potential confounders such as diet, physical activity, family history, or medication use. Future longitudinal studies with larger, multi-site samples and objective measures of stress and fatigue are needed.

These findings have several practical implications. The company should implement stress management programs, including regular relaxation breaks, counseling services, and workload assessment. Work fatigue can be reduced by ensuring adequate rest periods, optimizing shift schedules, and providing ergonomic workstations. Regular health screenings including blood pressure monitoring should be conducted. At the policy level, occupational health regulations should explicitly address psychosocial risk factors such as work stress and fatigue, requiring employers to assess and mitigate these risks.

## Conclusion

This study found significant associations between work stress and hypertension ($p=0.044$) and between work fatigue and hypertension ($p<0.001$) among 52 employees at PT. Milano Kebun Sei Daun. Employees with higher levels of work stress and work fatigue had higher proportions of hypertension. These findings highlight the need for workplace interventions targeting stress reduction and fatigue management, including adequate rest periods, shift schedule optimization, stress management programs, and regular blood pressure monitoring.

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