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THE RELATIONSHIP BETWEEN STRESS LEVELS AND BLOOD PRESSURE AMONG PRODUCTIVE-AGE ONLINE MOTORCYCLE TAXI DRIVERS IN BANDUNG CITY

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Abstract

Background: Hypertension is a major global health issue influenced by various factors, including stress. Online motorcycle taxi drivers are part of the productive-age workforce vulnerable to stress due to job uncertainty, long working hours, and exposure to traffic. **Objective:** This study aims to analyse the relationship between stress levels and blood pressure among productive-age online motorcycle taxi drivers in Bandung City. **Methods:** This quantitative study employed a cross-sectional design involving 147 respondents selected through random sampling. Data were collected using demographic questionnaires, the Perceived Stress Scale (PSS-10), and blood pressure measurements via digital sphygmomanometer. Data were analysed using univariate and bivariate methods, including Spearman's rank and Chi-square tests. **Results:** The study showed that the majority of respondents were male (91.8%) with an average age of 28 years, and 76.9% were smokers. Most respondents (92.5%) experienced moderate stress. Regarding blood pressure, 53.1% were in the prehypertension category, and 40.1% were in stage 1 hypertension. A significant positive correlation was found between stress level and systolic blood pressure ($p < 0.001$; $r = 0.462$), and diastolic blood pressure ($p = 0.002$; $r = 0.258$). Smoking behaviour and hypertension history also showed significant relationships with blood pressure. **Conclusion**: Stress levels are significantly associated with increased systolic and diastolic blood pressure in online motorcycle taxi drivers. These findings highlight the need for stress management and lifestyle interventions to prevent hypertension in informal sector workers.

Keywords: Stress, blood pressure, hypertension, online motorcycle taxi drivers, productive age

Introduction

According to the World Health Organization (WHO), 1.28 billion adults aged 30 to 79 worldwide suffer from high blood pressure, with the majority (two-thirds) residing in low- and middle-income countries. It is estimated that 46% of adults with high blood pressure are unaware of their condition. Less than half (42%) of adults are diagnosed and treated for high blood pressure, and about 1 in 5 adults (21%) with high blood pressure manage to control it. Hypertension is a leading cause of premature death worldwide. One of the global non-communicable disease goals is to reduce the prevalence of hypertension by 33% between 2010 and 2030 (WHO, 2022). In Indonesia, the Basic Health Research (Riskesdas) conducted by the Ministry of Health in 2018 showed an increase in the prevalence of hypertension compared to the 2013 data. Based on Riskesdas 2018, the prevalence of hypertension in Indonesia reached 34.1%, higher than in 2013, which was 25.8%. This data was obtained from blood pressure measurements in Indonesians aged 18 and above (Sina et al., 2024). The prevalence of hypertension in West Java Province is the highest compared to other provinces in Indonesia, at 39.6%. Bogor City has the highest number of hypertension sufferers in West Java, with 830,741 people (Stefani et al., 2023). In addition to Bogor, Bandung, as one of the major cities in West Java, also contributes significantly to this figure, reflecting the national hypertension trend. According to the 2018 Riskesdas data from the Ministry of Health, the prevalence of hypertension in Bandung is 1 in 3. This means that around 700,000 people in Bandung have hypertension. However, data from the Bandung City Health Office in May 2022 recorded only 28,000 residents aged 15-64 suffering from hypertension, which could threaten the health of the productive age group, as they are at high risk of hypertension due to often neglecting healthy living habits during their peak productivity phase, which can increase the likelihood of developing hypertension (Dinas Kesehatan Kota Bandung, 2022).

The high incidence of hypertension in the productive age group, particularly among workers, is attributed to unhealthy lifestyles. Lifestyle is a major factor influencing people's lives. Unhealthy habits, such as lack of physical activity, smoking, stress, and poor diet, especially those high in calories, fat, and sodium, can increase the risk of hypertension (Anggraini & Rd. Halim, 2023). According to the Ministry of Health of the Republic of Indonesia in 2017, the population is categorized into three groups: the youth group (under 18 years), the productive age group (18-64 years), and the non-productive age group (above 65 years). The 0-14 age group is considered economically non-productive. The productive age is the range where individuals can work and generate goods and services (Hardin et al., 2023). One risk factor for high blood pressure or hypertension is stress, which has a negative effect on the body. During stress, the body reacts by releasing stress hormones like adrenaline and cortisol. These hormones cause the heart to beat faster and induce vasoconstriction of blood vessels, leading to increased blood pressure (Pamela, 2023).

Stress arises from environmental pressures that affect individuals, triggering physical and psychological responses. Stress can also cause increased blood pressure in individuals already suffering from hypertension. Stress reactions include rapid breathing, rapid heart rate, and cold sweat. Stress can affect anyone regardless of age, and it is generally categorized into three levels: mild stress, moderate stress, and severe stress (Situmorang et al., 2020). Stress is a term used to describe physical, emotional, cognitive, and behavioral responses to events perceived as threats or challenges. It is also an emotional disturbance or environmental change caused by stressors. Stress can originate from within the individual, family environment, living environment, or places where

individuals spend significant time, such as offices and educational institutions, and is common among workers in the productive age group (Somatisasi et al., 2020).

Professions in the productive age group at high risk of stress include office workers and online motorcycle taxi (ojek online) drivers. According to Girdhar et al. (2016), office workers face stress risks due to lack of physical activity and work-related stress, such as tight deadlines and frequent overtime. A study by (Novia et al., 2023) found that online motorcycle taxi drivers experience high stress levels due to uncertainty in daily earnings, pressure from daily targets, competition among drivers, and traffic situations. A study involving 271 online motorcycle taxi drivers in the Greater Jakarta area found that 42.1% experienced stress, with 8.1% reporting severe stress, 14.8% reporting moderate stress, 10% reporting mild stress, and 9.2% reporting light stress (Sabrina et al., 2022). Being an online motorcycle taxi driver carries a higher risk of stress compared to other professions. These drivers do not undergo regular medical check-ups, unlike office workers who are provided with medical check-up rights by their employers. Additionally, there is limited research on blood pressure measurements among online motorcycle taxi drivers (Novia et al., 2023).

The relationship between stress and elevated blood pressure is thought to occur through sympathetic nervous system activity, which gradually increases blood pressure. Adrenaline levels rise during stress, causing the heart to pump faster, which leads to increased blood pressure. If stress persists, it can result in high blood pressure (Ladyani et al., 2021). Previous studies have shown a significant relationship between stress levels and blood pressure in productive-age hypertensive patients at the Padang Bulan Medan Health Center. Among 68 respondents, the majority had moderate stress levels (74.4%) and grade 1 hypertension (39.7%) (Octavia et al, 2023). Based on previous studies, it can be concluded that efforts are needed to prevent severe stress levels so that hypertensive patients do not experience more severe hypertension or complications such as stroke, heart disease, and others. This prevention can be done by healthcare workers through health education on stress management and coping mechanisms so that hypertensive patients can apply them in daily life (Wulan Sari et al., 2024).

A literature review conducted by Yuafiah (2021) in her study on the relationship between stress levels and hypertension in productive-age individuals found that hypertension in this age group was more common in individuals with moderate and severe stress levels compared to those with mild or very severe stress. Damayanti et al. (2020) found a significant relationship between stress levels and hypertension in members of the Prolanis program in the Parongpong Health Center area. Increasing stress levels tend to trigger an increase in both systolic and diastolic blood pressure. Kamsari et al. (2022) in their study found no relationship between stress levels and hypertension in the elderly in Kambang Subdistrict, with data influenced by stress levels, marital status, and occupation. Based on the data presented and the differences between this study and previous research, this study was conducted in a different location and at a different time. Furthermore, it includes a distinguishing variable, which is stress, and employs a different measurement method, combining objective methods such as blood pressure measurements and even heart rate monitoring to provide more accurate data. Based on this, the researcher is interested in conducting a study titled “The Relationship Between Stress Levels and Blood Pressure Among Online Motorcycle Taxi Drivers in Bandung City”.

Method

This study was descriptive correlation with a cross-sectional study approach, conducted simultaneously at the same time to connect stress levels with blood pressure among online

motorcycle taxi drivers of productive age in Bandung city, Indonesia. The study was carried out in November - December 2024. The population was online motorcycle taxi drivers of productive age in Bandung City. The sample was selected using random sampling to represent the overall population. The sample size was calculated using G-Power version 3.1 with assumptions of an effect size f^2 of 0.3, alpha 0.05, and power 0.95, resulting in 134 respondents. Inclusion criteria include active drivers aged 18–60 years and residing in Bandung City. Exclusion criteria include having a history of chronic diseases, mental disorders, or taking certain medications.

Demographic Data Includes information on age, gender, education level, marital status, lifestyle (smoking or not), and health status, particularly the respondent's medical history. Blood Pressure Measurement – Measured using an automatic digital sphygmomanometer, which allows for practical measurement without using a stethoscope. The device provides direct results on an LCD screen. Blood pressure measurement categories include: Normal (<120/<80 mmHg)**;** Prehypertension (120–139/80–89 mmHg)**;** Hypertension Stage 1 (140–159/90–99 mmHg)**;** Hypertension Stage 2 (≥160/≥100 mmHg) (Pramudono et al., 2020).

Stress Level Measurement using The Perceived Stress Scale (PSS-10) developed by Cohen et al. in 1983. This instrument consists of 10 questions assessing how much stress individuals perceive in their daily life. Each item is rated on a scale from 0 (never) to 4 (very often). Four positively worded questions are reverse scored before the total score is calculated. The final result is classified into three categories: Mild stress (score 1–14); Moderate stress (15–26) ;Severe stress (>26)**.** PSS-10 has been shown to have high validity and reliability, with Cronbach Alpha coefficients ranging from 0.82 to 0.96 in various studies, including the Indonesian version used in this study (Andreou et al., 2011).

Data Collection Primary data is obtained directly from respondents through the questionnaire related to stress levels and blood pressure measurements using a sphygmomanometer. Secondary data is collected from documentation, such as prevalence data on hypertension in productive-age individuals and statistical information about online motorcycle taxi drivers in Bandung City.

Data analysis will be performed using univariate and bivariate methods. Univariate analysis will be used to describe the characteristics of the respondents and the main variables using frequency, percentage, median, standard deviation, and minimum and maximum values. Bivariate analysis will be conducted using Spearman's test, Mann-Whitney U, and Chi-square tests to examine the relationships between demographic data, stress levels, and blood pressure.

Results

The study on the relationship between stress levels and blood pressure in productive-age online motorcycle taxi drivers in Bandung City was conducted with a sample of 147 respondents. This research utilized a descriptive quantitative design with a cross-sectional study method. The study was carried out in January 2025. The results obtained from this study are as follows.

Table 1. Characteristics of Respondents (N=147)

Variable	Mean Score (±SD) Range	F	Percentage (%)
Age	28.00 ± 6.126 19-53		
Gender			
Male		135	91.8 %
Female		12	8.2 %
Education Level			

Variable	Mean Score (±SD) Range	F	Percentage (%)
Junior High School		19	12.9 %
Senior High School		107	72.8 %
College		21	14.3 %
Marital Status			
Married		82	55.8 %
Single		65	44.2%
Lifestyle			
Smoker		113	76.9 %
Non-smoker		34	23.1 %
Hypertension History			
Has had Hypertension		66	44.9
Has not had Hypertension		81	55.1

Based on Table 1, it shows the average age of the respondents is 28 years, with the majority being male (91.8%) and having the highest education level of senior high school (72.8%). 55.8% of respondents are married, while 76.9% are smokers. Regarding hypertension history, 44.9% of respondents have experienced it.

Table 2. Descriptive Analysis (N=147)

Variable	Mean Score (±SD) **Range**	F	**%**
Stress Level	21.00 ± 3.643 9-32		
Stress Mild		4	2.7 %
Stress Moderate		136	92.5 %
Stress Severe		7	4.8 %
Systolic Blood Pressure	134.00 ±13.053 90-169		
Normal		9	6.1 %
Prehypertension		78	53.1 %
Hypertension Stage 1		59	40.1 %
Hypertension Stage 2		1	0.7 %
Diastolic Blood Pressure	90.00 ±15.373 63-143		
Normal		23	15.6 %
Prehypertension		42	28.6 %
Hypertension Stage 1		50	34.0 %
Hypertension Stage 2		32	21.8 %

Based on Table 2, the data on the respondents' stress levels and blood pressure are shown. The average stress level is 21, with 92.5% of respondents experiencing moderate stress. For systolic blood pressure, the average is 134 mmHg, with 53.1% of respondents in prehypertension and 40.1% in hypertension stage 1. The average diastolic blood pressure is 90 mmHg, with 15.6% normal, 28.6% in prehypertension, 34.0% in hypertension stage 1, and 21.8% in hypertension stage 2.

Table 3. Relationship Between Demographics and Blood Pressure

Variable	Blood Pressure	
	Rho	P-Value
Age	-0.004	0.962
Education Level	0.082	0.326
Stress Level	0.462	0.001

Based on Table 3, the statistical analysis shows that age does not have a significant correlation with systolic blood pressure (rho = -0.004, p = 0.962). Education level also does not show a significant relationship with systolic blood pressure (rho = 0.082, p = 0.326). Stress Level has significant correlation Blood Pressure (rho = 0.462, p < 0.001).

Discussion

Majority of the respondents (92.5%) experienced moderate stress. This indicates that the work as an online motorcycle taxi driver carries a significant psychological burden. This finding supports the theory by Marchelia et al. (2014) which explains that work-related stress arises when job demands exceed an individual's capacity to cope. Online motorcycle taxi drivers often face pressures such as travel targets, traffic jams, competition with other drivers, and diverse customer interactions. The researcher assumes that the high stress levels among online motorcycle taxi drivers may be due to several factors, including the uncertainty of daily income, long working hours, and uncomfortable road conditions. Additionally, stress may also increase due to social pressures, such as family responsibilities for those who are married. Therefore, mental health interventions like stress management and psychosocial support should be considered to improve their well-being.

Majority of the respondents had above-normal blood pressure. The relevant theory related to this finding is the pathophysiology of heart hypertension theory by Anita Hidayati (2022) which explains that high blood pressure can be influenced by various factors, including chronic stress, unhealthy lifestyle, and genetic factors. Chronic stress can increase the release of cortisol and adrenaline hormones, leading to vasoconstriction and an increase in blood pressure. The researcher assumes that the high blood pressure levels among online motorcycle taxi drivers are likely influenced by a combination of unhealthy eating habits, sedentary lifestyles due to prolonged sitting, and chronic work stress. Additionally, the high smoking habits can exacerbate blood pressure conditions, as nicotine causes blood vessel constriction and significantly raises blood pressure. According to Unja et al. (2020) men tend to be more susceptible to unhealthy lifestyles such as smoking and irregular eating patterns, which can increase the risk of hypertension. Previous research by Ghani et al. (2016) states that hypertension risk factors are more related to lifestyle and health history than demographic factors like gender or marital status.

Statistical analysis shows a significant positive relationship between stress levels and blood pressure. Respondents with higher stress levels tend to have higher blood pressure. This finding is in line with the study by Raden Sugeng Riyadi (2024), which mentions that psychological stress can affect blood pressure regulation through the sympathetic nervous system and the release of stress hormones like cortisol. Over time, chronic stress can cause hypertension and increase the risk of cardiovascular diseases. The researcher assumes that the high stress levels experienced by online motorcycle taxi drivers could be a major factor contributing to the increase in their blood pressure. Chronic stress leads to increased sympathetic nervous system activity, which ultimately raises blood pressure. Additionally, individuals experiencing stress tend to have unhealthy habits like smoking and consuming foods high in salt, which can worsen hypertension conditions.

Conclusion

These findings emphasize the importance of attention to stress management and healthy lifestyle practices for online motorcycle taxi drivers, as well as the need for community-based interventions to prevent the risk of hypertension in informal workers who are vulnerable to physical and psychological stress.

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