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The Impact of Workload During the Productive Age on Hypertension in Elderly Patients at Lisna YPK PLN Clinic Lampung

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ABSTRACT

Introduction : *Hypertension is often compared to a silent ticking clock in the body, striking unexpectedly with cardiovascular disease. Among its many triggers, occupational workload during productive years is often overlooked, though it may leave scars that surface as hypertension in later life.*
Objectives : *This study assessed the association between past workload and hypertension among elderly patients at Klinik Lisna YPK PLN Lampung.*
Methods : *A cross-sectional quantitative study was carried out in June 2025. From 215 elderly patients, 140 were purposively selected. Workload history was measured using the NASA-TLX questionnaire, while hypertension status was obtained from medical records and blood pressure checks. The dataset was examined through Mann–Whitney U testing and logistic regression, adopting a significance level of 0.05.*
Results : *Most respondents reported high workload (62.86%), followed by very high (24.29%) and moderately high (12.86%). Hypertension was found in 50% of participants. A significant association was observed (p = 0.000274). Logistic regression showed that high workload increased hypertension risk 4.128 times (p = 0.020), and very high workload 4.118 times (p = 0.031), compared to moderate workload.*
Conclusion : *Workload in productive years is like a shadow that follows into old age, shaping the risk of hypertension. Incorporating occupational history into screening may open the door to earlier detection and better prevention for the elderly.*

Introduction

Hypertension is often likened to a “silent shadow” that trails humanity across the globe—unseen, yet steadily carving paths toward cardiovascular disease. The World Health Organization (2023) estimates that 1.28 billion adults aged 30–79 live with this condition, and nearly half remain unaware of its presence. Like a tide that rises quietly but persistently, the global burden of hypertension continues to swell, making it one of the foremost causes of premature death and disability worldwide.

In Indonesia, hypertension stands as the fourth leading cause of mortality, responsible for 10.2% of all deaths (Ministry of Health, 2024). National health surveys such as Riskesdas (2013, 2018) and the Indonesian Health Survey (SKI, 2023) paint a consistent picture of rising prevalence, as though climbing a staircase toward an uncertain future. Riskesdas 2018 reported that 8.36% of adults had been diagnosed by physicians, yet direct measurements revealed a much higher figure, uncovering the hidden scale of this “quiet enemy.”

Focusing on Java, the nation’s most densely populated island, the prevalence appears as a mosaic of risk. According to Riskesdas 2018, rates were 10.17% in DKI Jakarta, 9.67% in West Java, 8.17% in Central Java, 10.68% in the Special Region of Yogyakarta, 8.01% in East Java, and

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8.61% in Banten. These numbers sketch a landscape of vulnerability across the economic heartland of the country.

Lampung Province mirrors this troubling trend. Riskesdas (2018) recorded physician-diagnosed hypertension at 7.95%, but direct measurements showed nearly one in three adults—29.94%—to be hypertensive. In Bandar Lampung City, prevalence surged from 8.2% in 2013 to 16.71% in 2018, signaling that the "silent tide" is creeping ever closer to local communities.

At Lisna YPK PLN Clinic Lampung, the problem becomes even more personal. Internal records from 2024 revealed that hypertension ranked as the second most common diagnosis after respiratory infections, with 103 patients identified—72 of whom (69%) were elderly. Conversations with these patients echo the burdens of their past: years spent on physically strenuous work such as power line installation and infrastructure repair, or mentally demanding roles in planning, administration, and operational targets. These burdens, carried like invisible weights, resurface decades later as hypertension in old age.

Workload during productive years thus represents more than occupational duty; it becomes a "footprint" etched into the body, leaving behind physiological scars that only time reveals. The chronology unfolds as follows: prolonged occupational stress in midlife—long hours, strict deadlines, and heavy responsibilities—gradually accumulates strain. Continued exposure to psychosocial and physical pressures fosters unhealthy coping patterns such as poor diet, smoking, or inactivity. Over the years, these behaviors amplify the damage. Biologically, sustained stress keeps the sympathetic nervous system in overdrive, raising catecholamine and cortisol levels, narrowing blood vessels, stiffening arterial walls, and progressively reshaping cardiovascular function. What begins as invisible wear and tear in midlife ultimately resurfaces as hypertension in later years.

This life-course perspective explains why many elderly patients at Lisna YPK PLN Clinic Lampung, once diligent workers shouldering heavy loads of responsibility, now grapple with hypertension. The urgency of this issue is heightened by Indonesia's demographic transition: projections from BPS, UNFPA, and PPN (2019) estimate that life expectancy will rise to 72 years by 2035. As more Indonesians live longer, the delayed consequences of midlife workload will inevitably emerge more clearly in old age.

Therefore, the present study was designed to illuminate the association between productive-age workload and hypertension among the elderly at Lisna YPK PLN Clinic Lampung. Beyond identifying correlations, the aim is to provide a compass for prevention—encouraging health workers to weave occupational history into hypertension screening. At multiple levels, solutions are needed: globally, WHO recommends regular blood pressure screening, salt reduction policies, promotion of physical activity, and universal access to antihypertensive therapy; nationally, Indonesia implements Posbindu PTM and the Healthy Living Movement (GERMAS) to strengthen early detection and lifestyle change; regionally, provinces across Java expand community education, primary care programs, and occupational health initiatives; and locally, Lisna YPK PLN Clinic can integrate occupational history into patient assessments, provide lifestyle counseling for elderly patients and families, and ensure regular blood pressure monitoring. By aligning global, national, regional, and local strategies, the hidden footprints of midlife workload need not transform into burdens of old age.

Research Objectives

1. To determine the frequency distribution of workload during the productive years among elderly patients with hypertension at Lisna YPK PLN Clinic Lampung.
2. To determine the frequency distribution of hypertension incidence among elderly patients at Lisna YPK PLN Clinic Lampung based on their productive-age workload.

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3. To determine the effect of productive-age workload on the incidence of hypertension among elderly patients at Lisna YPK PLN Clinic Lampung.

Methods

This study was carried out using an analytical quantitative approach with a cross-sectional design, serving as a "snapshot in time" to trace the hidden footprints of midlife workload and their echoes in the form of hypertension among elderly patients at Lisna YPK PLN Clinic Lampung. The research unfolded in June 2025 within the outpatient unit, where every patient's story became part of the larger mosaic of findings.

From the total population of 215 elderly individuals (≥60 years), 140 respondents were carefully selected through purposive sampling. The inclusion criteria acted as a "filter," allowing only those aged 60 years or above, actively registered as patients, and able to communicate effectively to step into the frame of this study.

The independent variable was the occupational workload borne during productive years, measured using the NASA-Task Load Index (NASA-TLX). This instrument may be viewed as a "weighing scale of human effort," capturing six interwoven strands of labor: mental demand, physical demand, temporal demand, task performance, effort, and frustration. Each respondent was guided through the scoring and pairwise weighting process, weaving these strands together into a composite workload index. The dependent variable, hypertension, was determined from medical records and confirmed through direct blood pressure measurement. A calibrated digital sphygmomanometer served as the "window into vascular health," with readings taken after at least five minutes of calm, seated rest.

The tools of inquiry were threefold: (1) a form mapping demographic characteristics and hypertension status, (2) the NASA-TLX questionnaire as the main compass of workload assessment, and (3) a pairwise comparison matrix to refine the weighting of each dimension. Before stepping into the main study, these instruments were "tested on the waters" with 30 elderly participants outside the principal sample. The results revealed strong foundations, as all items surpassed validity thresholds (r count > r table) and reliability remained robust (Cronbach's alpha > 0.70).

The analytical journey moved through univariate and bivariate terrains. The Mann–Whitney U test acted as a "lens" to detect differences in workload distribution, while binary logistic regression functioned as a "spotlight," illuminating how occupational workload amplified the risk of hypertension. The boundary of statistical significance was set at $p < 0.05$, within a 95% confidence interval.

Finally, ethical approval served as the "green light" for this research to proceed. Clearance was formally granted by the Health Research Ethics Committee of the Faculty of Health, Indonesian Mitra University (Approval No. S.25/087/FKES10/2025, June 2, 2025), ensuring the study's path remained aligned with established ethical principles.

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Results

Univariate Analysis

Respondents in this study consisted of 140 elderly individuals aged ≥60 years. The demographic distribution is presented in Table 1.

Tabel 1. Characteristics of Respondents (n = 140)

No	Variable	Mean ± SD	Min–Max	n	%
1	**Age (years)**	65.42 ± 5.00	61–81	140	100
2	**Gender**				
	Male			111	79.3
	Female			29	20.7
3	**Type of Work**				
	Operator Gardu			2	1.4
	Maintenance			7	5.0
	Finance Staff			17	12.1
	Logistics & Assets			9	6.4
	HR Staff			13	9.3
	Network Technician			28	20.0
	Generation Technician			64	45.7
4	**Length of Work (years)**	29.39 ± 1.20	25–32	140	100
5	**Workload Score (0-100)***	68.28 ± 14,97	32.3–94	140	100
6	**Hypertension**				
	No			70	50
	Yes			70	50

*Workload was measured using NASA-TLX (0–100 scale).

A total of 140 elderly respondents participated in this study. The mean age was 65.42 ± 5.00 years, ranging from 61 to 81 years. In terms of gender distribution, the majority were male, accounting for 111 individuals (79.3%), while female respondents comprised 29 individuals (20.7%). Regarding occupational history during the productive years, the largest group consisted of generation technicians, totaling 64 individuals (45.7%), followed by network technicians with 28 individuals (20.0%), finance staff with 17 individuals (12.1%), HR staff with 13 individuals (9.3%), logistics and assets staff with 9 individuals (6.4%), maintenance workers with 7 individuals (5.0%), and substation operators with 2 individuals (1.4%). The average length of work was 29.39 ± 1.20 years, with a minimum of 25 years and a maximum of 32 years. The workload score assessed using the NASA-TLX instrument yielded a mean of 68.28 ± 14.97, with values ranging from 32.3 to 94, indicating relatively high occupational demands during the respondents' productive years. With respect to health outcomes, 70 respondents (50.0%) were diagnosed with hypertension, while the remaining 70 respondents (50.0%) were not hypertensive.

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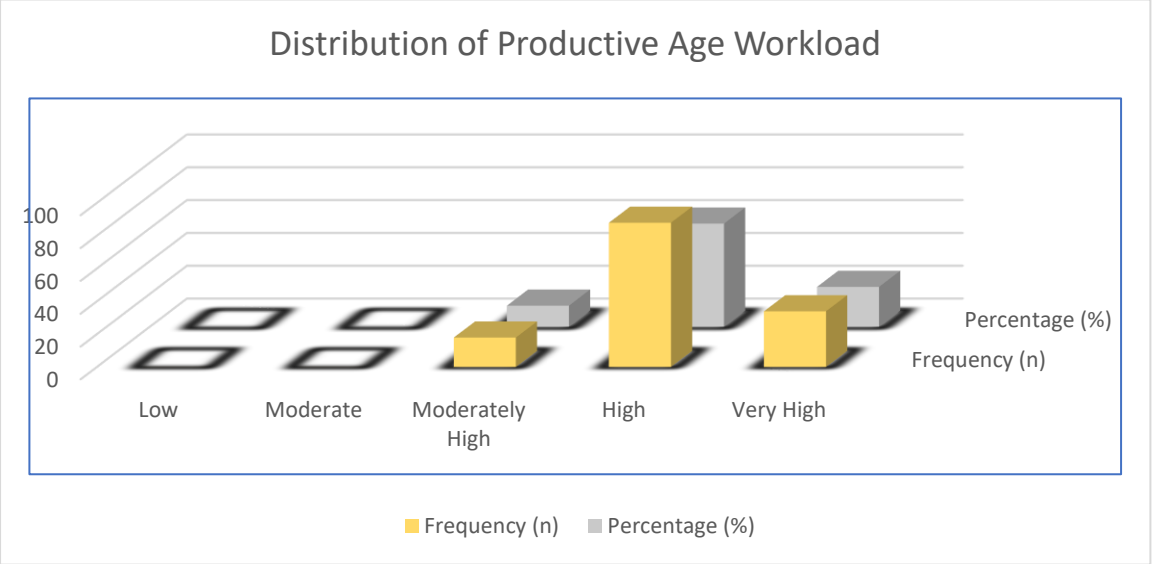
A high workload was attributed to the majority of respondents (62.86%), while very high (24.29%) and moderately high (12.86%) levels were also recorded, with none found in the low or moderate category. These patterns suggest that most elderly individuals had once carried



occupational demands like long shadows stretching from their productive years into old age.

Figure 1. Distribution of Productive Age Workload

Bivariate Analysis

The normality check revealed that the NASA-TLX scores did not follow the conventional distribution path ($p < 0.05$). As a result, the Mann–Whitney U test was summoned to illuminate the differences, exposing a clear divergence in the "echoes of past labor" between elders bearing hypertension and those unburdened by it ($p = 0.000274$).

Table 2. Mann Whitney U Test Results

Variabel	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig (2-tailed)
NASA-TLX	1577.000	4062.000	-3.639	0.000274

From binary logistic regression, it was shown that workload carved a steeper path toward hypertension. Respondents burdened with high workload faced a 4.128-fold greater chance ($p = 0.020$), while those with very high workload encountered a 4.118-fold higher risk ($p = 0.031$), compared with the moderately high group.

Table 3. Binary Logistic Regression

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	B	Sig.	Exp(B)
Workload		0,059	
High Workload	1,418	0,020	4,128
Very High Workload	1,415	0,031	4,118
Constant	-1,253	0,027	0,286

Discussion

The findings of this study show that elderly individuals with a history of high workload during their productive years were more likely to experience hypertension compared to those with lower workloads. This result reflects the idea that workload acts as a "silent footprint" on the body, leaving physiological traces that only emerge later in life.

Demographic characteristics

Demographic characteristics of the respondents provide important context. The mean age was 65.4 years, indicating that most participants were in the early stage of elderly life. Age is a well-established risk factor for hypertension, as vascular elasticity naturally decreases with aging, leading to higher blood pressure (Kemenkes, 2019). The dominance of male respondents (79.3%) is consistent with occupational patterns at PLN, where men are more frequently assigned to physically demanding jobs. Previous studies also noted that men tend to have higher hypertension prevalence at younger ages, while the risk for women rises after menopause due to hormonal changes (Susilo & Wulandari, 2011). In terms of job type, almost half (45.7%) had worked as generation technicians and one-fifth (20.0%) as network technicians, both of which involve heavy physical and mental workload. This occupational distribution reinforces the relevance of workload as a critical factor influencing health outcomes in later life.

Workload

Workload, assessed using the NASA-TLX instrument, yielded a mean score of 68.3, which falls within the high workload category. This suggests that the majority of respondents carried demanding occupational responsibilities. According to Tarwaka et al. (2004), workloads that exceed human capacity can trigger both physical strain and psychological stress, potentially leading to chronic health issues. Manuaba (2000, cited in Vanchapo, 2020) also emphasized that continuous exposure to high workload without adequate recovery may disrupt homeostasis and accelerate the onset of diseases such as hypertension. These findings are in line with Lin et al. (2021), who demonstrated that workers exposed to shift duties and heavy workloads were significantly more prone to hypertension than their counterparts with lighter job demands.

Hypertension prevalence

Hypertension prevalence in this study was found to be exactly 50% among respondents (70 hypertensive and 70 non-hypertensive). This balanced distribution illustrates how occupational workload is only one part of the causal chain, interacting with lifestyle factors such as diet, smoking, and exercise. Some respondents may have developed protective habits that delayed the onset of hypertension, while others may have accumulated multiple risks, thereby tipping the balance toward disease. This result resonates with the concept of "cumulative risk" in life-course epidemiology, where both occupational and behavioral exposures accumulate over decades to influence health outcomes in old age (Kuh & Ben-Shlomo, 2004).

Implications

Implications of these findings extend to both occupational health and geriatric care. At the preventive level, interventions should be initiated during the productive years, including workload regulation, ergonomic improvements, and stress management programs, to minimize

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the long-term cardiovascular burden. In clinical settings, integrating occupational history into hypertension screening could help health workers better identify at-risk elderly patients. This aligns with WHO's global strategy on non-communicable diseases, which emphasizes early detection and risk factor modification (WHO, 2023).

Research Limitations

This study is not without limitations, which should be considered in interpreting the findings. First, the research relied on a retrospective approach, where information on past workload was obtained from elderly respondents. This reliance on memory increases the possibility of recall bias and may reduce the accuracy of the reported data. In addition, the availability of theoretical literature was relatively limited, and access to recent international journals was not optimal, which may have affected the depth of analysis. Another important limitation is that other influential factors, such as dietary habits, salt intake, physical activity, and psychological stress, were not specifically measured, thus posing potential confounding effects on the relationship studied. Furthermore, the use of the NASA-TLX questionnaire involved subjective scoring based on individual perceptions, which could differ across respondents and influence the assessment results. The study population was also restricted to retired employees seeking treatment at Lisna YPK PLN Clinic Lampung, limiting the generalizability of the results to broader elderly populations or other occupational groups. Lastly, the cross-sectional design prevents the establishment of direct causal relationships between productive age workload and the occurrence of hypertension.

Conclusion

This study found that the majority of elderly respondents had experienced high workloads during their productive years, and this was strongly associated with the presence of hypertension in later life. While both normal and hypertensive groups were dominated by respondents with high workload histories, the proportion was notably greater among those with hypertension. Statistical analysis confirmed significant differences, and logistic regression indicated that high and very high workloads increased the risk of hypertension more than fourfold compared to moderate workloads.

These findings underline the importance of considering occupational workload history as a risk factor for hypertension in the elderly. The study contributes to a deeper understanding of how past work conditions may influence long-term health outcomes. However, due to limitations such as recall bias, restricted study population, and unmeasured lifestyle factors, further research is recommended. Future studies should adopt longitudinal approaches and include wider populations while examining additional determinants like diet, physical activity, and stress to strengthen the evidence on workload as a contributor to hypertension.

Ethics approval and consent to participate

Approval for this research was provided by the Health Research Ethics Committee of the Faculty of Health, Indonesian Mitra University (Approval No: S.25/087/FKES10/2025, June 2, 2025). The objectives and procedures of the study were explained to each participant, and written consent was obtained as a formal promise before their involvement. Confidentiality and anonymity were safeguarded as though a protective curtain had been drawn, ensuring that personal identities remained unseen throughout the study.

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