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Original Research Article

Analysis of Factors Associated with The Incidence of Hypertension in Menopausal Women in The Teluk Tiram Health Center Working Area

Risna Ariani[1,2*], Meitira Syahadatina Noor[3], Hardyan Sauqi[4], Oski Illiandri[5], Nia Kania[6]
[1]Almeta Medika Clinic, Padat Karya Street, Banjarmasin 70122, South Kalimantan, Indonesia
[2]Public Health Study Program, Faculty of Medicine and Health Sciences, Lambung Mangkurat University, Jalan Ahamd Yani Km. 36, Banjarbaru, 70619, South Kalimantan, Indonesia
[3]Public Health Study Program, Faculty of Medicine and Health Sciences, Lambung Mangkurat University, Jalan Ahamd Yani Km. 36, Banjarbaru, 70619, South Kalimantan, Indonesia
[4]Obstetrics and Gynecology Specialist Doctor Education Program, Faculty of Medicine and Health Science, Universitas Lambung Mangkurat, Veteran Street, Banjarmasin 70122, South Kalimantan, Indonesia
[5]Department of Biomedical Sciences, Faculty of Medicine and Health Science, Universitas Lambung Mangkurat, Veteran Street, Banjarmasin 70122, South Kalimantan, Indonesia
[6]Department of Anatomical Pathology, Faculty of Medicine and Health Science, Universitas Lambung Mangkurat, Veteran Street, Banjarmasin 70122, South Kalimantan, Indonesia
*Corresponding Author, Email: drrizariani@gmail.com

ABSTRACT

This study analyzes the distribution of characteristics and factors associated with hypertension among menopausal women in the Teluk Tiram Health Center area. Hypertension is a significant health issue affecting postmenopausal women, yet local evidence from community-based health care in Indonesia is limited. A cross-sectional design was used, involving 105 menopausal women. Data collection included structured surveys assessing age at menopause, Body Mass Index (BMI), physical activity, stress levels, sleep quality, and history of hormonal contraceptive use. Bivariate analysis, utilizing chi-square tests, along with multivariate analysis through logistic regression, was conducted to identify associated factors. The findings indicated that early menopause, high BMI, low physical activity, elevated stress levels, poor sleep quality, and a history of combined hormonal contraceptive use were significantly related to hypertension. Multivariate analysis further identified BMI as the most influential factor, succeeded by low physical activity and high stress levels. These results underscore the importance of weight management, promotion of physical activity, and stress reduction strategies to lower the risk of hypertension in menopausal women. Ultimately, this research emphasizes the multifactorial nature of hypertension during menopause and calls for comprehensive prevention strategies in primary care settings.

Keywords: Hypertension; Menopausal Women; Body Mass Index (BMI); Stress Level; Physical Activity

INTRODUCTION

Hypertension remains a leading contributor to global morbidity and mortality, disproportionately affecting women after the menopausal transition due to hormonal and metabolic changes (World Health Organization, 2023). Declining estrogen levels during menopause are known to alter vascular function, lipid metabolism, and body fat distribution, thereby increasing

susceptibility to elevated blood pressure in postmenopausal women. Beyond hormonal factors, lifestyle and psychosocial determinants such as obesity, stress, poor sleep quality, physical inactivity, and history of hormonal contraceptive use further contribute to the risk of hypertension in this population (Zhou et al., 2021) (Lee et al., 2022).

Previous studies have consistently demonstrated that women experiencing early menopause are at a higher risk of hypertension compared to those with later menopause onset (Anagnostis et al., 2020)**.** Obesity, particularly central adiposity, is strongly linked to hypertension in menopausal women (Zhang et al., 2025)**,** while the use of combined hormonal contraceptives has also been associated with elevated risk (Lee et al., 2022). In addition, psychosocial stress and inadequate sleep quality have emerged as significant correlates of blood pressure elevation (Zhou et al., 2021), and physical inactivity remains a well-established risk factor (Sagalulu, Rona Febriyona, 2023)

Despite this growing body of evidence, most existing studies are derived from high-income countries, where cultural, dietary, and health system contexts differ substantially from those in Southeast Asia. Research focusing on Indonesian women is limited, particularly in community-based primary health care settings. Sociocultural factors such as high-carbohydrate dietary patterns, limited access to preventive health services, and lifestyle behaviors may uniquely influence the development of hypertension in menopausal women in Indonesia.

Therefore, this study aims to identify the determinants of hypertension among menopausal women in Indonesia, focusing on lifestyle, reproductive, and psychosocial factors within the context of a primary health care setting. The findings are expected to provide evidence-based insights for tailored prevention and management strategies for hypertension in postmenopausal women.

METHOD

This study employed a quantitative research design with a cross-sectional approach to analyze the factors associated with the incidence of hypertension in menopausal women in the working area of the Teluk Tiram Community Health Center, Banjarmasin City. The study was conducted from January to March 2025.

The study population consisted of all menopausal women who underwent health examinations at the Teluk Tiram Community Health Center during the study period. The sample was selected using incidental sampling, a non-probability technique, due to the limited availability of eligible participants and the unpredictable attendance of patients at the health center. This approach was considered the most feasible for ensuring an adequate sample size within the study timeframe. The final sample included 105 participants, determined using the Lemeshow formula.

Data were collected through face-to-face interviews using a structured questionnaire that had been tested for validity and reliability. Construct validity was assessed using Pearson correlation between each item and the total score, while reliability was evaluated using Cronbach's alpha, with a threshold of ≥0.70 considered acceptable. The questionnaire measured variables including age at menopause, history of hormonal contraceptive use, Body Mass Index (BMI), stress levels, sleep quality, and physical activity.

For data analysis, bivariate analysis with chi-square tests was performed to examine the association between independent variables and the incidence of hypertension. Furthermore, multiple logistic regression was conducted to identify the most dominant factors. All analyses were performed using SPSS version 27.

To ensure data quality, verification techniques were applied, including double-checking of questionnaire entries and supervised data collection, to minimize bias and enhance the credibility of the results.

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RESULTS AND DISCUSSION

This study analyzed factors associated with the incidence of hypertension in menopausal women in the working area of Puskesmas Teluk Tiram. The findings indicate that several variables—including age at menopause, history of combined hormonal contraceptive use, Body Mass Index (BMI), stress levels, sleep quality, and physical activity—are significantly associated with the risk of hypertension.

Frequency Distribution of Respondents' Characteristics and Factors Associated with Hypertension

Tabel 1. Frequency Distribution of Hypertension Incidence Variables and Associated Factors in Respondents

No.	Characteristics of Respondents	Frequency	Percent (%)
1.	**Incidence of Hypertension**		
	Hypertension (≥140/90 mmHg)	59	56.2
	Not Hypertensive (<140/90 mmHg)	46	43.8
2.	**Age at Menopause**		
	<45 years	7	6.7
	≥ 45 years	98	93.3
3.	**Contraceptive Use History**		
	Combination Hormonal	62	59
	Non-hormonal/non-combined hormonal	43	41
4.	**Body Mass Index (BMI)**		
	Overweight and Obesity (>23)	67	63.8
	Normal and Underweight (<18.5-22.9)	38	36.2
5.	**Stress Level**		
	Severe (PSS Score 19-40)	56	53.3
	Mild (PSS Score 0-18)	49	46.7
6.	**Sleep Quality**		
	Poor (PSQI Score >5)	58	55.2
	Good (PSQI Score ≤5)	47	44.8
7.	**Physical Activity**		
	Poor (GPAQ MET Score < 600)	53	50.5
	Moderate (GPAQ MET Score ≥ 600)	52	49.5

Source: Primary Data 2025

The frequency distribution of respondents' characteristics showed that most women experienced menopause at ≥45 years (93.3%). A total of 63.8% of respondents were categorized as overweight or obese, which is consistent with the high prevalence of obesity as a risk factor for hypertension in menopausal women (Rizki, 2024)**.** In the local context of Teluk Tiram, dietary patterns dominated by high-salt and high-fat foods, coupled with limited opportunities for structured exercise, may contribute to this finding.

Furthermore, 59% of respondents reported a history of combined hormonal contraceptive use, and many of them also had elevated BMI. This overlap indicates that the interaction between contraceptive use and obesity may further increase the risk of hypertension. Stress levels were high in 53.3% of respondents, which often coincided with poor sleep quality (55.2%). This suggests that psychosocial stressors, such as household economic burden or family

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responsibilities—common in the study setting—could exacerbate both sleep disturbances and hypertension risk (Maki et al., 2024).

Physical inactivity was also notable, with 50.5% of respondents engaging in minimal daily activity. This aligns with the sedentary lifestyle observed in many women in the working area of Teluk Tiram Health Center, where housework often replaces structured physical exercise. Limited recreational facilities and cultural perceptions of women's roles may also contribute to the low activity levels, which further elevate the risk of hypertension (Sagalulu, Rona Febriyona, 2023).

Analysis of the Relationship between Age at Menopause and the Incidence of Hypertension

The results indicate a significant association between age at menopause and the incidence of hypertension among menopausal women. The chi-square test produced a p-value of 0.016 (<0.05), with a Prevalence Ratio (PR) of 1.885 (95% CI: 1.564–2.270). This finding suggests that women who experienced menopause before the age of 45 years had nearly twice the prevalence of hypertension compared to those whose menopause occurred at ≥45 years. One possible explanation is that earlier menopause prolongs the postmenopausal period, thereby extending the duration of estrogen deficiency, which may contribute to vascular changes and increased blood pressure (Piťha et al., 2023).

These findings are consistent with a systematic review and meta-analysis**,** which reported that early menopause (<45 years) is associated with an elevated risk of hypertension compared to menopause at the normal age (≥45 years). The meta-analysis found an Odds Ratio (OR) of 1.10 (95% CI: 1.01–1.19; p = 0.03). Taken together, both the present study and previous evidence reinforce that early menopause should be considered an independent risk factor for hypertension, highlighting the need for targeted screening and preventive strategies in this population (Anagnostis et al., 2020).

Table 2. Bivariate Analysis of the Relationship between Age at Menopause and the Incidence of Hypertension

Age at Menopause	Hypertension Incidence				Total		P value	PR 95% CI
	Hypertension		Not Hypertensive					
	N	%	N	%	N	%		
< 45 years	7	100	0	0	7	100	0,016	**1,885** 1,564-2,270
≥ 45 years old	52	53.1	46	46.9	98	100		

This study found that women who entered menopause at an older age had a significantly higher risk of developing hypertension. The chi-square test showed a meaningful association (p < 0.05), with the prevalence of hypertension being greater among those experiencing menopause at ≥50 years compared to younger groups. This finding is supported by Sadiman and Dita, 2024, who reported that older menopausal women had a 3.2-fold higher risk of hypertension (Sadiman & Dita, 2024).

The mechanism underlying this association is related to prolonged estrogen decline, which reduces vascular elasticity and impairs blood pressure regulation. However, in the local context of Teluk Tiram, lifestyle factors such as high dietary salt intake and low physical activity may further amplify the impact of later menopausal age on blood pressure. Thus, age at menopause should not be seen solely as a biological risk factor, but also as a marker of vulnerability requiring targeted hypertension prevention strategies in primary care.

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Analysis of the Relationship between History of Combined Hormonal Contraceptive Use and the Incidence of Hypertension

Table 3. Bivariate Analysis of the Relationship between History of Combined Hormonal Contraceptive Use with Hypertension Incidence

History of Combined Hormonal Contraceptive Use	Incidence of Hypertension				Total		*P* value	PR 95% CI
	Hypertension		Not Hypertensive					
	N	%	N	%	N	%		
Combination Hormonal	43	69,4	19	30,6	62	100	0,001	**3,819** 1,681-8,679
Non-hormonal/Non-combined hormonal	16	24,2	27	18,8	43	100		

The present study found a significant association between the history of combined hormonal contraceptive use and the incidence of hypertension among menopausal women (p = 0.001). Women with such a history had a nearly fourfold higher prevalence of hypertension compared to those who did not use combined hormonal contraceptives (PR = 3.819; 95% CI: 1.681–8.679). Approximately 69.4% of women with contraceptive history were hypertensive, compared with 24.2% among non-users. Although this confirms the strong relationship, the presence of hypertension among non-users also reflects the multifactorial nature of the condition. The biological plausibility of this association is supported by evidence that estrogen-containing contraceptives can activate the *renin–angiotensin–aldosterone system* (RAAS), leading to sodium retention and vascular constriction, thereby elevating blood pressure (Cameron et al., 2023). This risk may be amplified in women with additional factors such as obesity or psychosocial stress, which are also prevalent in Indonesian communities.

These findings are consistent with previous studies in Indonesia and other regions. Katanna, (2022) reported a tenfold higher risk of hypertension among contraceptive users in rural Java, while Tatali et al. (2021) observed an even stronger association with an OR of 39.0. The variation in effect size across studies may be due to differences in contraceptive formulations, duration of use, or the coexistence of lifestyle-related risk factors (Tatali, C.S., Kundre, R.M. and Bataha, 2021).

From a public health perspective, these results underscore the importance of counseling women about the cardiovascular risks of combined hormonal contraceptives, particularly within primary health care settings in Indonesia. Preventive strategies should include regular blood pressure monitoring, early detection of comorbid risk factors, and health education on lifestyle modification (balanced diet, physical activity, and stress management). Such integrated approaches are crucial to mitigating the burden of hypertension among menopausal women.

Analysis of the Relationship between Body Mass Index (BMI) and the Incidence of Hypertension in Menopausal Women

This study demonstrated a strong association between Body Mass Index (BMI) and the incidence of hypertension in menopausal women (p < 0.001). Women classified as overweight or obese had more than a fivefold higher prevalence of hypertension compared to those with normal or

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underweight BMI (PR = 5.092; 95% CI: 2.152–12.047). Approximately 70.1% of women in the overweight/obese group were hypertensive, while 31.6% of women with normal BMI also had hypertension, highlighting the multifactorial nature of the condition.

Table 4. Bivariate Analysis of the Relationship between Body Mass Index (BMI) and the Incidence of Hypertension in Menopausal Women

Body Mass Index (BMI)	Incidence of Hypertension				Total		*P* value	PR 95% CI
	Hypertension		Not Hypertensive					
	N	%	N	%	N	%		
Overweight and Obesity	47	70,1	20	29.9	67	100,	0,000	**5,092** 2,152-12,047
Normal and Underweight	12	31,6	26	68.4	38	100		

The relationship between obesity and hypertension is biologically plausible. Excess visceral adiposity contributes to increased vascular resistance, activation of the *renin–angiotensin–aldosterone system* (RAAS), and heightened sympathetic nervous activity, all of which elevate blood pressure (Azzubaidi et al., 2023). In menopausal women, reduced estrogen exacerbates these mechanisms, increasing susceptibility to obesity-related hypertension (Rahmadini et al., 2024).

The findings are consistent with previous research in Indonesia. Harnanda & Widayanti, (2019) reported a significant correlation between higher BMI and elevated blood pressure in menopausal women in Surabaya, while Asari & Helda, (2021) found obesity to be associated with a sixfold higher risk of hypertension among elderly populations in Medan. Such consistency across diverse Indonesian communities underscores the importance of addressing obesity as a key determinant of hypertension in this population.

From a public health perspective, these findings suggest that weight management should be prioritized in hypertension prevention programs for menopausal women. Interventions should not only emphasize regular physical activity and balanced nutrition, but also integrate routine BMI and blood pressure monitoring within primary health care settings in Indonesia. By targeting obesity and related lifestyle factors, health systems can more effectively reduce the burden of hypertension in menopausal women.

Analysis of the Relationship between Stress Levels and Incidence of Hypertension in Menopausal Women in the Teluk Tiram Community Health Center Working Area

The results showed that the level of stress had a significant relationship with the incidence of hypertension in menopausal women in the working area of the Teluk Tiram Health Center. Based on bivariate analysis, a p-value of 0.029 (<0.05) was obtained, which indicates that higher levels of stress are closely associated with an increased risk of hypertension. The Prevalence Ratio (PR) of 2.390 (95% CI: 1.085-5.262) indicates that menopausal women with severe stress levels have more than twice the risk of suffering from hypertension compared to those with mild stress levels.

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Table 5. Bivariate Analysis of the Relationship between Stress Levels and Hypertension Incidence in Menopausal Women in the Teluk Tiram Community Health Center Working Area

Stress Level	Hypertension Incidence				Total		P value	PR 95% CI
	Hypertension		Not Hypertensive					
	N	%	N	%	N	%		
Severe (PSS Score 19-40)	37	66,1	19	33,9	56	100,0	0,029	**2,390** 1,085-5.262
Mild (PSS Score 1-18)	22	44,9	27	55,1	49	100,0		

The data obtained from this study showed that 66.1% of respondents with severe stress experienced hypertension, which reinforces the finding that high stress can increase the risk of hypertension. However, although many women with severe stress had hypertension, there were also 44.9% of respondents with mild stress levels who had hypertension. This confirms that hypertension is not only influenced by stress levels alone, but also by various other factors, such as genetic factors, medical history, as well as other risk factors that have been identified in this study, such as body mass index (BMI), history of hormonal contraceptive use, sleep quality, and physical activity.

The pathophysiological mechanisms underlying the association between stress and hypertension are likely to be interactive with other risk factors. Stress can trigger unhealthy habits, such as consumption of foods high in salt, fat and sugar, as well as lack of motivation to exercise, smoking and excessive alcohol consumption. These habits, which generally arise in response to stress, are independent risk factors that can exacerbate hypertension, even in individuals with mild stress. Therefore, even if the level of stress is considered mild, continuous and prolonged exposure to stress can still contribute to increased blood pressure (Septian, 2024).

On a physiological level, when a person experiences stress, the sympathetic nervous system is activated, triggering the release of hormones such as cortisol, adrenaline, and noradrenaline. These hormones cause blood vessels to constrict (vasoconstriction), increase heart rate, and strengthen heart contractions, all of which contribute to increased blood pressure. In addition, chronic stress can activate the Hypothalamic-Pituitary-Adrenal (HPA) axis, which increases the release of cortisol. This cortisol can trigger sodium and water retention and increase the sensitivity of blood vessels to vasoconstrictor substances, which in turn increases blood pressure (Yuliadi, 2021) . In menopausal women, hormonal changes that occur during this phase, such as decreased estrogen levels, often increase the tendency towards stress due to symptoms such as hot flashes, mood swings, and social role adjustments. The interaction between these hormonal changes and high levels of stress can exacerbate blood pressure problems, making menopausal women more prone to hypertension (Woro Riyadina, 2019).

This finding is in line with research conducted by (Ajiningtyas, Fatimah and Rahmayanti, 2018) at the Pangkalan Lada Health Center, which also found a significant relationship between stress and hypertension in menopausal women, with a p-value = 0.001. The study confirmed that stress plays an important role in increasing the risk of hypertension in menopausal women. In addition, research in the working area of Puskesmas Tlogosari Wetan Semarang also found a significant relationship between stress and hypertension, with p-value = 0.000 (<0.05). The results of this study indicate that the higher the level of stress, the higher the risk of hypertension in

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menopausal women. Stress in menopausal women is often caused by various factors, both internal (such as hormonal changes) and external factors that occur on an ongoing basis (Yulistina, Deliana and Rustiana, 2017).

These findings have important implications in the prevention and management of hypertension in menopausal women. Stress, both mild and severe, needs to be considered as a potential risk factor contributing to the incidence of hypertension. Therefore, it is important for medical personnel and the public to raise awareness of the importance of stress management in the prevention of hypertension. In addition, hypertension prevention programs in menopausal women should involve a holistic approach, including stress management, increased physical activity, healthy diet, and regular blood pressure monitoring.

Analysis of the Relationship between Sleep Quality and the Incidence of Hypertension in Menopausal Women

This study demonstrated a significant association between stress levels and the incidence of hypertension in menopausal women (p = 0.029). Women with severe stress had more than twice the risk of hypertension compared to those with mild stress (PR = 2.390; 95% CI: 1.085–5.262). Among women with severe stress, 66.1% were hypertensive, while 44.9% of those with mild stress also experienced hypertension, highlighting that stress interacts with other determinants such as BMI, sleep quality, and lifestyle factors.

Table 6. Bivariate Analysis of the Relationship between Sleep Quality and the Incidence of Hypertension in Menopausal Women

Sleep Quality	Hypertension Incidence				Total		P value	PR 95% CI
	Hypertension		Not Hypertensive					
	N	%	N	%	N	%		
Poor (PSQI Score>5)	42	72,4	16	27,6	58	100	0,000	**4,632** 2,024-10,602
Good (PSQI Score≤5)	17	36,2	30	63,8	47	100		

The mechanism linking stress to hypertension is multifactorial. Activation of the sympathetic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis increases cortisol and catecholamine levels, leading to vasoconstriction, sodium retention, and higher blood pressure (Yuliadi, 2021). In menopausal women, psychosocial stressors—such as role transitions, economic insecurity, and family responsibilities—can intensify this physiological response, especially when combined with hormonal changes (Woro Riyadina, 2019).

These findings are consistent with previous Indonesian studies. Ajiningtyas et al., (2018) reported a significant association between stress and hypertension among menopausal women in Central Kalimantan, while Yulistina et al., (2017) found similar results in Semarang. This consistency suggests that psychosocial stress is a pervasive determinant of hypertension in Indonesian women across different regions.

Importantly, stress does not act in isolation. In our study, women with severe stress often reported poor sleep quality and limited physical activity—factors that may compound the risk of hypertension. This highlights the need to address stress within a broader framework of lifestyle and behavioral health interventions.

From a public health perspective, these results underscore the importance of integrating

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stress management strategies into community-based hypertension prevention programs. Primary health care services in Indonesia could implement early detection and counseling modules for stress, coupled with lifestyle interventions such as group exercise programs, relaxation training, and peer-support groups for menopausal women. By embedding stress management within hypertension screening initiatives, community health systems can more effectively reduce cardiovascular risk among menopausal women.

Analysis of the Relationship between Physical Activity and the Incidence of Hypertension in Menopausal Women

This study revealed a significant association between physical activity and hypertension among menopausal women (p = 0.000). Women with insufficient activity had a more than fourfold higher risk of hypertension (PR = 4.457; 95% CI: 1.948–10.198). The prevalence of hypertension was 73.6% in the low-activity group compared with 38.5% among women who reported sufficient activity.oup compared with 38.5% among women who reported sufficient activity.

Table 7. Bivariate Analysis of the Relationship between Sleep Quality and Incidence of Hypertension in Menopausal Women

Physical Activity	**Incidence of Hypertension**				**Total**		**P value**	**PR 95% CI**
	Hypertension		**Not Hypertensive**					
	N	%	N	%	N	%		
Deficient (GPAQ MET score < 600)	39	73,6	14	26,4	53	100,0	0,000	**4,457** 1,948-10,198
Fair (GPAQ MET Score > 600)	20	38,5	32	61,5	52	100,0		

Although adequate physical activity demonstrated a protective effect, more than one-third of active women were also hypertensive. This suggests that hypertension in menopausal women is multifactorial: beyond physical inactivity, other determinants such as diet, stress, sleep quality, and BMI interact to elevate cardiovascular risk. For example, women reporting both low physical activity and high stress levels in this study were more likely to experience hypertension, supporting the idea of cumulative risk from behavioral and psychosocial factors.

Physiologically, low activity contributes to elevated blood pressure by increasing resting heart rate, peripheral vascular resistance, and sympathetic nervous system activation. Conversely, regular exercise reduces oxidative stress, promotes vasodilation, and improves insulin sensitivity, all of which contribute to healthier blood pressure regulation (Nuranita et al., 2024). Among menopausal women, reduced estrogen may further lower energy metabolism and muscle mass, making it more difficult to maintain adequate activity levels. However, these biological changes are often compounded by local socio-cultural factors, such as sedentary work, limited recreational facilities, and high-sodium dietary patterns.

Our findings are consistent with prior studies in Indonesia Sagalulu, Rona Febriyona, (2023) and support global evidence that physical activity is a critical modifiable determinant of hypertension. Importantly, while international guidelines emphasize moderate-to-vigorous exercise, in resource-limited settings like Indonesia, community-based approaches such as group exercise at primary care centers, culturally adapted aerobic programs, and health campaigns

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targeting sedentary lifestyles may be more feasible and sustainable.

From a public health perspective, interventions should go beyond individual counseling and integrate structured physical activity promotion into community health programs. This could include embedding exercise sessions in routine health services, creating safe public spaces for physical activity, and training health workers to incorporate activity counseling into hypertension screening. By situating physical activity within a broader strategy of lifestyle modification, community health systems can more effectively reduce the burden of hypertension among menopausal women.

Analysis of the Most Dominant Factors Associated with the Incidence of Hypertension in Menopausal Women

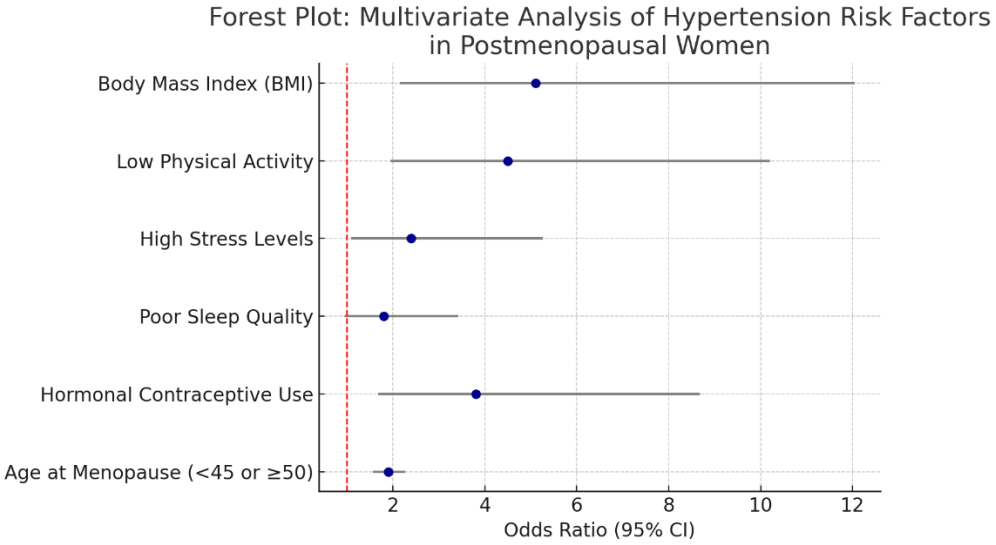

Figure 1. Forest Plot of Multivariate Logistic Regression Analysis

Figure 1 illustrates the adjusted odds ratios (OR) and 95% confidence intervals (CI) of factors associated with hypertension in menopausal women. Body Mass Index (BMI) emerged as the strongest determinant, with overweight/obese women having more than five times the odds of developing hypertension compared to those with normal or underweight BMI (OR = 5.09, 95% CI: 2.15–12.04). Low physical activity and a history of combined hormonal contraceptive use were also significantly associated with higher odds of hypertension. Stress levels demonstrated a moderate but meaningful contribution. The forest plot highlights BMI as the most dominant factor, reinforcing the importance of weight management interventions as a central strategy in hypertension prevention among menopausal women.

The multivariate logistic regression analysis, presented in the forest plot, demonstrates that Body Mass Index (BMI) is the most dominant factor associated with hypertension in menopausal women, with overweight and obese individuals having more than fivefold increased odds compared to those with normal BMI. Low physical activity and a history of combined hormonal contraceptive use were also significantly associated with elevated hypertension risk, while stress levels contributed moderately. These findings confirm that hypertension in menopausal women is multifactorial, but weight status remains the strongest determinant.

From a public health perspective, these results highlight the need for integrated

interventions in primary care, focusing on weight management, physical activity promotion, and stress reduction. Tailored community-based strategies targeting menopausal women could play a pivotal role in reducing the burden of hypertension and its complications.

CONCLUSION

This study identified Body Mass Index (BMI) as the most dominant factor associated with hypertension among menopausal women in a primary health care setting in Indonesia. Women who were overweight or obese had a markedly higher risk of developing hypertension, as confirmed by multivariate analysis. While other factors—including physical inactivity, high stress levels, poor sleep quality, and a history of combined hormonal contraceptive use—also contributed to hypertension, BMI exerted the strongest influence, particularly in the context of hormonal changes during menopause. Given the cross-sectional nature of this study, the findings cannot establish causality. However, they highlight important targets for intervention. At the individual level, weight management, regular physical activity, and stress and sleep regulation are essential components of prevention strategies. At the public health level, integrating hypertension screening, lifestyle counseling, and community-based weight control programs into primary health care services could provide sustainable benefits. Overall, this study underscores the multifactorial nature of hypertension in menopausal women and calls for a comprehensive, community-oriented approach that combines medical management with lifestyle modification to reduce the burden of hypertension and improve women's quality of life.

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