Exploring Hypertension Management Practices at Community Health Center Mojolangu Indonesia: Insights from Patient Profiles

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ABSTRACT
Hypertension, often referred to as the "silent killer," represents a significant public health concern in Indonesia, contributing to an increased risk of cardiovascular disease, stroke, and kidney failure. The prevalence of hypertension in Indonesia is exceedingly high, with 34.1% of adults affected by hypertension in 2018. This study employed a cross-sectional design, utilizing general clinic registration book data and prescriptions to analyze demographic profiles, visits, and antihypertensive treatment profiles. The findings at PuskesmasMojolangu in Indonesia indicated that the majority of hypertensive patients were female (70.91%), with the highest age range being 55-64 years (35.05%) and age > 65 years (34.91%). Furthermore, the study examined the frequency of repeat visits among hypertensive patients. The majority of patients (17.66%, or 261 individuals) made a single visit, while 29.36% (217 patients) who returned to the health center for a subsequent visit had unstable blood pressure. Furthermore, the analysis revealed that the most frequently prescribed treatment profile was amlodipine, representing 66.14% of cases with a dose of 10 mg once a day. This was observed in 2125 out of 3612 prescriptions. Overall, this study provides a comprehensive insight into hypertension management in the Indonesian primary care setting, where low re-visits to health centers were found, and the most widely used treatment profile was amlodipine.

INTRODUCTION

The treatment patterns associated with hypertension and their impact on blood pressure fluctuations at the Mojolangu Community Health Center in Indonesia are highlighted by the persistent and increasing prevalence of hypertension, which represents a significant public health challenge in the country. Hypertension remains a significant cause of morbidity and mortality due to uncontrolled blood pressure, which is often exacerbated by a lack of knowledge and awareness among patients [1]. It has been demonstrated that the effective management of hypertension is closely associated with medication adherence and the rational use of antihypertensive drugs, which are frequently suboptimal in primary health care settings [2][3]. For instance, a study conducted in Surabaya revealed that the majority of hypertensive patients did not achieve the desired blood pressure targets, with a considerable proportion reporting non-adherence to medication and poor lifestyle behaviours, including inadequate physical activity and a high intake of salt[3].

Cultural practices exert a profound influence on dietary habits, which in turn represent a significant risk factor for hypertension. For example, the consumption of foods with high sodium content, such as instant foods, is a prevalent aspect of Indonesian culture and has been associated with increased rates of hypertension. A study found that individuals who frequently consumed instant foods were 0.78 times more likely to develop hypertension compared to those who consumed them less frequently [4]. Additionally, traditional Indonesian diets often include foods high in salt, which has been demonstrated to have a significant association with hypertension[5]. Coffee consumption, another cultural habit, is pervasive in Indonesia and has been identified as a risk factor for hypertension, with studies indicating a significant correlation between high coffee intake and elevated blood pressure levels [6].

Furthermore, the existence of drug therapy problems (DTPs), including unnecessary drug use, the necessity for supplementary therapy, and adverse drug reactions, has a considerable impact on blood pressure control [7]. Additionally, family support and the role of health workers have been identified as crucial factors influencing treatment adherence and comprehensive hypertension management[8][9]. Moreover, community-based interventions, such as counseling and educational

programs, have been demonstrated to enhance knowledge and attitudes toward hypertension, consequently improving treatment adherence and blood pressure control [10][11]. Demographic profiles and lifestyle factors, such as smoking, physical inactivity, and obesity, also exert a significant influence on the prevalence and management of hypertension [12].

In light of these disparate concerns, a comprehensive investigation at the Mojolangu Community Health Center is imperative to ascertain patterns of antihypertensive medication utilization, adherence rates, and their direct impact on blood pressure fluctuations. The findings of this study may provide valuable insights into the optimization of hypertension management strategies, the tailoring of interventions to improve medication adherence, and the ultimate reduction of the burden of hypertension in the community. Furthermore, the results may inform policy decisions and healthcare practices, ensuring that patients receive the most effective and rational antihypertensive treatment, supported by strong community education and engagement programs.

METHOD

The research conducted at the Mojolangu Health Center in Malang City pertains to the profile of antihypertensive drug utilization among hypertensive patients at the aforementioned center. The patient samples utilized in the study were patients diagnosed with hypertension (INA-CBG code I10) who received antihypertensive drug therapy at the Mojolangu Health Center between January and December 2022. The data were obtained from the General Poly Registration Book and subsequently cross-checked with existing prescriptions in the pharmacy unit. This research has been granted ethical clearance (ethical feasibility) with the following number: No.E.5.a/158/KEPKUMM/VI/2021

RESULT AND DISCUSSION

Table 1 Patient Demographic Characteristics

Patient Characteristics		Quantity	Percentage
Total Patients		739	100,00%
Insurance	Social Security Agency on Health	580	78,48%
	Non-Insurance	159	21,52%
Age	15-24	1	0,14%
	25-34	8	1,08%
	35-44	48	6,50%
	45-54	165	22,33%
	55-64	259	35,05%
	> 65	258	34,91%
Gender	Male	215	29,09%
	Female	524	70,91%

Table 1 illustrates the status of insurance and indicates that 78.48% of the total number of patients are BPJS patients. This is due to the fact that BPJS provides comprehensive health insurance that covers chronic diseases such as hypertension, thus ensuring that patients receive ongoing care without the additional financial burden that would otherwise be incurred, which encourages a greater number of individuals to seek and adhere to treatment [13]. This is of particular importance for the management of hypertension, a condition that necessitates lifelong care and regular monitoring. Furthermore, the implementation of programs such as the reverse referral system ensures that hypertensive patients receive consistent follow-up care, thereby increasing the number of patients under BPJS who effectively manage their condition [13].

Table 1 illustrates that the age category of 55 years and above exhibits the highest number of age ranges. Hypertensive patients aged 55 years and above are highly prevalent in Indonesia due to a combination of physiological, lifestyle, and socio-economic factors. As individuals age, there is a natural decline in body function, including cardiac function, which increases the risk of The prevalence of hypertension in the elderly in Indonesia is notably high, with rates of 45.9% in the 55-64 years age group, 57.6% in the 65-74 years age group, and 63.8% in those aged 75 years and above [14]. This high prevalence is further compounded by unhealthy lifestyles, such as inadequate

consumption of vegetables and fruits, which are prevalent among 95.5% of the Indonesian population [15]. Furthermore, obesity represents a substantial risk factor for hypertension, with studies indicating that it is the predominant risk factor associated with the condition in the elderly[16]. Additionally, poor sleep quality, low levels of physical activity, and low educational attainment have been identified as contributing factors to elevated rates of hypertension [17]. Socioeconomic factors, such as employment status and marital status, have also been linked to hypertension, with employed and married individuals exhibiting distinct risk profiles[16].

The elevated prevalence of hypertension among women relative to men at the Mojolangu Health Center is consistent with the findings of the Indonesian Family Life Survey (IFLS) wave 5, which documented a significantly higher prevalence of hypertension among women (56.73%) compared to men (47.05%)[18]. This trend is consistent with data from the 2018 Basic Health Research (Riskesdas), which reported a prevalence of 36.85% in women compared to 31.34% in men. One contributing factor is the higher prevalence of obesity among women, as observed in the 2018 National Basic Health Survey (Riskesdas). In this survey, 34.3% of hypertensive subjects were obese women, compared to 19.2% in the normal blood pressure group [19]. Furthermore, women tend to engage in less physical activity than men, which is negatively associated with hypertension[20]. Socioeconomic factors also play a role, as analysis of the Socio-Demographic Index (SDI) revealed significant changes in the prevalence of hypertension among different income groups, with middle-income men showing the highest increase but women still maintaining a higher overall prevalence [21].

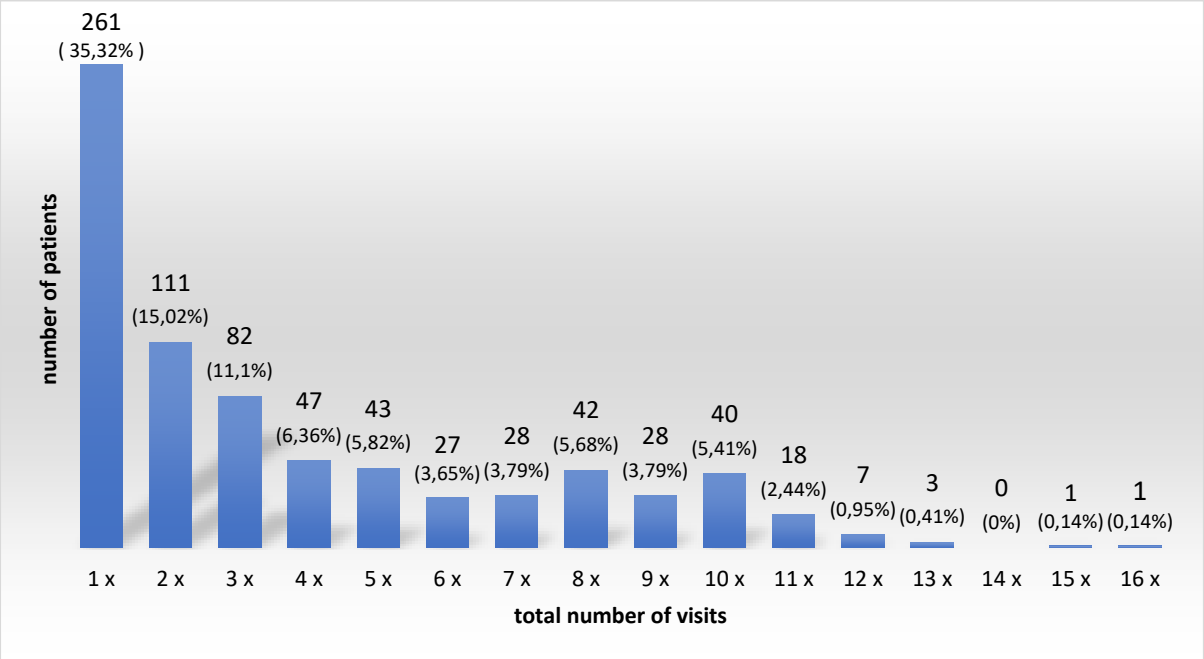

Figure 1 Overview of Patient Visits to the Health Center in 2022

As illustrated in the table above, 17.66% of hypertension patients only visited the health center on a single occasion. The low rate of repeat visits by patients to health centers is influenced by a number of factors. One significant reason is the perceived poor quality of services and facilities, which results in low patient loyalty and satisfaction. Studies have demonstrated that deficiencies in reliability, responsiveness, attentiveness, and the availability of adequate facilities at health centers contribute to this problem [22].A significant reason is the lack of symptoms, as many patients do not perceive themselves to be unwell and therefore do not consider follow-up visits to be necessary. This accounts for 24.8% of missed appointments[23].Economic and employment barriers also contribute to this phenomenon, as some patients are unable to afford the time or costs associated with regular visits[24]. Distance to the health facility is another factor, with 22.3% of patients finding it too far to travel. Systemic issues such as long waiting times and lack of clear instructions from healthcare providers further prevent patients from returning [23].

Table 2 Overview of blood pressure control

Patient Characteristics		Amount	Percentage
blood pressure control	only BP at the beginning of the visit	261	35,32%
	controlled (BP < 140/90 mmHg)	70	9,47%
	uncontrolled (BP > 140/90 mmHg)	191	25,85%
	unstable at each visit	217	29,36%
Total Patients		739	100,00%

A review of the data in Table 2 reveals that only 9.47% of patients who made a repeat visit demonstrated a controlled examination result (blood pressure < 140/90 mmHg). This is attributable to a number of factors, including poor sleep quality, stress, obesity, and non-adherence to medication regimens. The majority of hypertensive patients exhibit unstable blood pressure, with poor sleep quality identified as a significant contributing factor [25].Lifestyle factors such as high salt and coffee consumption, as well as obesity, are also closely associated with uncontrolled hypertension. These factors worsen the condition, making it more difficult to maintain stable blood pressure levels[26]. Furthermore, non-adherence to antihypertensive medication significantly affects blood pressure stability. Many patients fail to adhere to the prescribed treatment regimen, which impedes the healing process and may worsen their condition, potentially leading to fatal outcomes[27].

Regular visits to health centers are essential to effectively monitor and manage hypertension, as they allow for timely adjustments in therapy and provide ongoing education and support to patients[28].The absence of this routine monitoring can result in increased visit-to-visit variability in systolic blood pressure (SBP), which is associated with an elevated risk of stroke and coronary heart disease[29]. Non-adherence to antihypertensive medication, frequently attributable to infrequent visits to health centers, serves to exacerbate this variability and contributes to poor blood pressure control. Furthermore, the burden on primary health care (PHC) services is uneven, with only a small proportion of diagnosed hypertensive patients receiving adequate follow-up, which further complicates effective disease management[30]. In veterans with severe hypertension, despite more frequent follow-ups and increased medication use, a significant number of patients remained uncontrolled, suggesting that even when visits occur, management may not be aggressive enough[31].

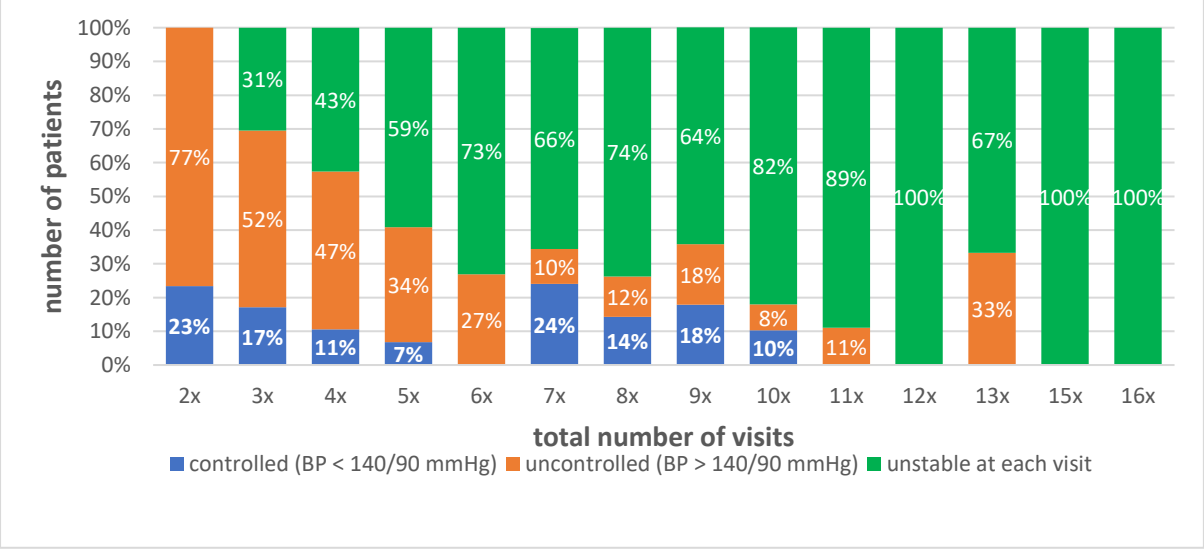

Figure 2. Patient's Blood Pressure Control

Table 3 illustrates that 29.36% of patients have unstable blood pressure, with blood pressure readings at each visit occasionally below 140/90 mmHg and at other times above this threshold. Additionally, 25.85% of patients have uncontrolled blood pressure, defined as a blood pressure reading at each visit consistently above 140/90 mmHg. The blood pressure of hypertensive patients is frequently unstable due to a multitude of factors. These include tobacco consumption, a lack of self-monitoring, a family

history of hypertension, which highlights genetic predisposition, overweight or obesity, and factors related to non-adherence to prescribed antihypertensive drugs.[32]

Table 3 Complications of the Patient's Disease

Patient Characteristics								Amount	Percentage
Total Patients								739	100,00%
	Hypertension	DM Type 2	Dyslipidemia	Obesity	Cva	Stable Angina	Hyperuric		
Diagnosis	+							491	66,44%
	+	+						179	24,22%
	+		+					14	1,89%
	+			+				12	1,62%
	+				+			9	1,22%
	+					+		3	0,41%
	+						+	2	0,27%
	+	+	+					11	1,49%
	+	+		+				6	0,81%
	+	+				+		1	0,14%
	+	+					+	4	0,54%
	+		+	+				1	0,14%
	+		+				+	1	0,14%
	+			+			+	1	0,14%
	+	+	+	+				2	0,27%
	+	+	+				+	1	0,14%
	+	+		+			+	1	0,14%

Hypertension represents a significant public health concern in Indonesia, with its prevalence exhibiting a pronounced increase over the past few years. As indicated by data from the Basic Health Research (RISKESDAS) program, the prevalence of hypertension increased from 25.8% in 2013 to 34.1% in 2018. This trend suggests that hypertension is becoming a more significant public health concern.[33]. This trend is consistent with the global pattern, whereby developing countries experience a higher increase in hypertension cases compared to developed countries [34]. As evidenced by the aforementioned data, 24.22% of patients with hypertension at the Mojolangu Health Center were also diagnosed with diabetes mellitus. The prevalence and odds ratio (OR) of hypertension among individuals with diabetes mellitus (DM) in Indonesia demonstrate significant relationships and risk factors. A study analyzing data from the 2018 Indonesian Basic Health Survey revealed that the prevalence of isolated systolic hypertension (ISH) among individuals with DM was 17.5%, with older age (≥65 years) being a significant determinant (OR= The results indicated that significant determinants of hypertension in this population included age (45-64 years, OR=4.59), low HDL cholesterol (OR=0.77), and longer duration of DM (OR=2.89) [35]. Another study, which utilized data from the 2014 Indonesian Family Life Survey, indicated that hypertension was an independent factor associated with a higher prevalence of DM, with an OR of 5.86, suggesting a strong association between these conditions[36].Additionally, data from the 2013 RISKESDAS survey indicated that the prevalence of DM with hypertension was 3.0%, with notable correlations with smoking (OR = 2.94 in men), obesity (OR = 2.35 in men and 2.19 in women), and blood cholesterol levels (OR = 3.45 in women and 1.86 in men) [37]. Moreover, the 2018 RISKESDAS data indicated that a history of hypertension (POR = 1.25) and elevated diastolic blood pressure (POR = 1.90) were significant risk factors for obesity among individuals with DM, further complicating the health outcomes for these individuals[38].

Table 4 Patient Treatment Pattern

Medicine	Number of Prescriptions		How to Take Medicine	Number of Prescriptions		Drug Dosage	Number of Prescriptions	
	n	%		n	%		n	%
Nifedipine	366	10,13%	1x1	23	0,64%	10 mg	23	0,64%
						15 mg	0	0,00%
						20 mg	0	0,00%
						30 mg	0	0,00%
			2x1	127	3,52%	10 mg	116	3,21%
						15 mg	10	0,28%
						20 mg	1	0,03%
						30 mg	0	0,00%
			3x1	216	5,98%	10 mg	212	5,87%
						15 mg	4	0,11%
						20 mg	0	0,00%
						30 mg	0	0,00%
Amlodipine	2389	66,14%	1x1	2389	66,14%	5 mg	264	7,31%
						10 mg	2125	58,83%
Captopril	611	16,92%	1x1	10	0,28%	12,5 mg	0	0,00%
						25 mg	9	0,25%
						50 mg	1	0,03%
			2x1	447	12,38%	12,5 mg	39	1,08%
						25 mg	303	8,39%
						50 mg	105	2,91%
			3x1	154	4,26%	12,5 mg	0	0,00%
						25 mg	152	4,21%
						50 mg	2	0,06%
Bisoprolol	40	1,11%	1x1	40	1,11%	2,5 mg	21	0,58%
						5 mg	19	0,53%
Furosemide	63	1,74%	1x1	63	1,74%	20 mg	20	0,55%
						40 mg	43	1,19%
HCT	105	2,91%	1x1	105	2,91%	12,5 mg	22	0,61%
						25 mg	83	2,30%
Lisinopril	15	0,42%	1x1	15	0,42%	5 mg	15	0,42%
Spironolactone	23	0,64%	1x1	23	0,64%	25 mg	23	0,64%
Total Prescription	3612	100,00%	Total Prescription	3612	100,00%	Total Prescription	3612	100,00%

As evidenced by the data presented in the table 4, amlodipine was prescribed at a rate of 66.14%, compared to captopril at 16.92% and nifedipine at 10.13%. Amlodipine is a more suitable choice for long-term management of hypertension due to its slow onset and long duration of action, as well as its ability to maintain stable blood pressure (BP) levels. [39]Additionally, studies have demonstrated that amlodipine is more cost-effective than other antihypertensive combinations, such as amlodipine-candesartan. This makes it a preferred choice in resource-limited settings, such as Indonesia. [40]. A comparison of amlodipine with captopril, an angiotensin-converting enzyme inhibitor, reveals that although amlodipine is effective in lowering blood pressure, it is often associated with a higher incidence of side effects, such as dry cough, which may further limit its use[41],In contrast, nifedipine Nifedipine, another calcium channel blocker, has been demonstrated to be effective in the acute reduction of blood pressure, particularly in cases of hypertensive crisis[42], However, it has a rapid onset and shorter duration of action, which may result in fluctuations in blood pressure and an increased risk of adverse cardiovascular events [43].

Amlodipine is more commonly utilized than captopril and nifedipine in Indonesia due to its favorable pharmacokinetic and pharmacodynamic profile, which translates into practical advantages in dosage and frequency of use. Amlodipine, a third-generation dihydropyridine calcium antagonist, has a slow onset of action and long duration of effect, allowing for once-daily dosing, which improves patient compliance[44][45]. This is in contrast to captopril, which necessitates twice-daily administration due to its shorter half-life, rendering it less convenient for patients[41][46].Furthermore, amlodipine's high oral bioavailability and slow hepatic biodegradation contribute to its sustained antihypertensive effect without significant plasma concentration fluctuations, resulting in a consistent blood pressure response with low variability[39][47]. Comparative studies have demonstrated that amlodipine is more efficacious in reducing blood pressure over a 24-hour period than captopril, which exhibits diminished efficacy towards the conclusion of the dosing interval[46].The EXCITE Study, conducted in Indonesia, provides further evidence of the efficacy and tolerability of the amlodipine/valsartan fixed-dose combination. It demonstrated a significant reduction in blood pressure and high patient compliance, which highlights the practical benefits of amlodipine in real-world clinical settings [48].

CONCLUSION

The research on the management of hypertension at the Mojolangu Health Center in Indonesia indicates that the rate of return visits by patients is exceedingly low. This is evidenced by data from a single visit, which accounted for only 17.66% of patients, while those who visited the health center at least 12 times constituted less than 1% of the total patient population. The data on blood pressure for each patient visit indicated that 29.36% were unstable and 25.85% were not controlled. The most frequently prescribed treatment was amlodipine 10 mg once, with a total of 58.83% of prescriptions.In light of the findings of this study, it is recommended that further investigation be conducted into the underlying causes of the observed decline in visits to the health center and the factors contributing to the observed variability in patient blood pressure.This study is limited to looking at only 1 health center, data collection can be expanded.

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DATA AVAILABILITY STATEMENT

The data used/or analyzed during the current study is available from the corresponding author on a reasonable request.

AUTHOR CONTRIBUTION STATEMENT

MT contributed to the conception and design of the research study; A contributed to the design of the research methods; EA contributed to creating the data collection instrument worksheets; MAM contributed to the conduct of data collection; KSM contributed to the conduct of data analysis; AI contributed to data cleaning; and AF contributed to the final revision of the manuscript. The authors have read and approved the final version of the manuscript. MT = Mutiara Titani; A = Akrom; EA = Elva Asmiati; MAM = Muhammad Alie Mansub; KSM = KhoirushShofa Mustaqim; AI = Ach. Ilham; and AF = Abdul Fadlil.

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