EVALUATION OF BLOOD PRESSURE, CHOLESTEROL, GLUCOSE, AND URIC ACID LEVELS IN PATIENTS AT THE OLAK KEMANG HEALTH CENTRE IN JAMBI CITY

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ABSTRACT

Hypertension is a chronic elevation of systemic arterial pressure beyond a level that may damage the endothelium. Individuals with hypertension typically demonstrate increased levels of blood glucose, cholesterol, and uric acid. Hyperlipidemia, age, and hypertension exhibit a complicated interplay that profoundly influences cardiovascular risk. Inadequate management of blood pressure and insufficient public awareness regarding the early detection of metabolic syndrome continue to significantly worsen the global prevalence of cardiovascular disease.This community service initiative assessed blood pressure and blood chemistry to identify early risk factors for cardiovascular disease. Olak Kemang Health Centre, affiliated with Jambi University's Faculty of Medicine and Health Sciences, conducts community service projects. Patients of the Regular Olak Kemang Health Center engaged in this research. Following an 8-hour fasting period, all individuals underwent assessments of their blood pressure, cholesterol levels, glucose, and uric acid concentrations. This study evaluated the blood pressure and clinical chemistry of 44 subjects. Seven patients (15.9%) exhibited pre-hypertension, twelve (27.3%) presented with stage 1 hypertension, and eleven (25%) were diagnosed with stage 2 hypertension. The majority of individuals with hypertension were aged 46 to 55 years. In the community service, 4 participants exhibited elevated uric acid levels, 9 had elevated glucose levels, and 7 had elevated cholesterol levels. Eight patients with stage 1 hypertension exhibited higher blood chemistry levels. Considering that glucose, cholesterol, and uric acid are associated with cardiovascular disease risk, it is advisable for patients with hypertension to have their levels regularly monitored. Their connection highlights the need for integrated management strategies to improve patient care and prevent complications.

Keywords: Elderly, Hypertension, Hyperlipidemia, Hyperglicemia, Hyperuricemia.

ABSTRAK

Hipertensi adalah peningkatan kronis tekanan arteri sistemik di atas level yang dapat merusak endotelium pembuluh darah. Individu dengan hipertensi biasanya menunjukkan peningkatan kadar glukosa darah, kolesterol, dan asam urat. Hiperlipidemia, usia, dan hipertensi menunjukkan interaksi yang meningkatkan resiko kejadian penyakit kardiovaskular. Manajemen tekanan darah yang tidak memadai dan kurangnya kesadaran publik mengenai deteksi dini sindrom metabolik terus memperburuk prevalensi penyakit kardiovaskular global secara signifikan. Kegiatan pengabdian masyarakat ini bertujuan untuk pemeriksaan tekanan darah dan kimia darah untuk mengidentifikasi lebih awal faktor risiko penyakit kardiovaskular. Kegiatan ini diinisiasi oleh Fakultas kedokteran dan Ilmu Kesehatan Universitas Jambi bekerja sama dan dilaksanakan di Puskesmas Olak Kemang Kota Jambi. Pasien Puskesmas Reguler Olak Kemang terlibat dalam kegiatan ini. Setelah puasa selama 8 jam, semua individu menjalani penilaian tekanan darah, kadar kolesterol, glukosa, dan konsentrasi asam urat. Studi ini mengevaluasi tekanan darah dan kimia klinis dari 44 peserta. Tujuh orang (15,9%) menunjukkan pra-hipertensi, dua belas orang (27,3%) menunjukkan hipertensi stadium 1, dan sebelas orang (25%) didiagnosis hipertensi stadium 2. Mayoritas individu dengan hipertensi berusia 46 hingga 55 tahun. Dalam pengabdian masyarakat, empat orang menunjukkan peningkatan kadar asam urat, sembilan orang memiliki peningkatan kadar glukosa, dan tujuh orang memiliki peningkatan kadar kolesterol. Delapan pasien dengan hipertensi stadium 1 menunjukkan kadar kimia darah yang lebih tinggi. Mengingat bahwa glukosa, kolesterol, dan asam urat berhubungan dengan risiko penyakit kardiovaskular, disarankan bagi pasien hipertensi untuk memantau kadar kimia darah secara teratur. Hubungan antara hipertensi dan sindrom metabolik menunjukkan perlunya strategi manajemen terpadu untuk meningkatkan perawatan pasien dengan hipertensi dan mencegah komplikasi.

Kata kunci: *Lansia, Hipertensi, Hiperlipidemia, Hiperglikemia, Hiperurisemia.*

INTRODUCTION

Hypertension is typically characterised by a persistent increase in systemic arterial pressure beyond a specified threshold. Hypertension represents a critical global public health issue, impacting approximately 1.4 billion people globally and significantly contributing to cardiovascular morbidity and mortality[1,2]. Global prevalence estimates suggest that hypertension impacts approximately 32% of the adult population, a statistic

that has consistently increased in recent decades as a result of demographic changes, urbanisation, and alterations in lifestyle patterns. Multiple factors underpin these epidemiological trends, contributing to the global burden of hypertension. Demographic transitions, particularly population ageing, along with rapid urbanisation, have resulted in heightened exposure to risk factors, including sedentary lifestyles, unhealthy dietary patterns, obesity, and chronic stress. The rising prevalence of hypertensive heart disease, as indicated by global burden studies, highlights the significant impact of hypertension on Disability-Adjusted Life Years (DALYs) and mortality worldwide[2].

The presence of metabolic diseases, such as diabetes mellitus, dyslipidaemia, and hyperuricaemia, is usually associated with hypertension. The interrelationship among themes is central to the pathogenesis of metabolic abnormalities that predispose individuals to cardiovascular events[3]. Evidence increasingly suggests that these metabolic components are interrelated processes rather than independent risk factors, capable of amplifying one another to contribute to vascular dysfunction and elevated blood pressure. The interaction between these conditions can be attributed to various factors. A hypothesis suggests that hyperlipidaemia and hyperglycemia lead to decreased nitric oxide levels, a significant vasodilator, which may result in endothelial dysfunction and increased vascular stiffness. Research supports the theory that activation of the renin-angiotensin system (RAS) may act as a common link between dyslipidaemia and hypertension. Treatments aimed at the RAS demonstrate potential in concurrently managing both conditions[4]. In individuals with type 2 diabetes, the excessive release of non-esterified free fatty acids (NEFFA) from visceral adipose tissue contributes to insulin resistance, which exacerbates hyperglycemia and perpetuates a cycle that leads to elevated blood pressure[5].

Hypertension is a significant public health concern in Indonesia, with studies documenting high prevalence rates across various regions and population subgroups. For instance, rural areas in East Indonesia have reported prevalence rates as high as 46.4% among adults aged ≥40 years[6]. Nationally representative surveys reveal that a significant segment of the adult population experiences high blood pressure, yet their awareness, treatment, and control are still inadequate[7]. The burden of hypertension is further compounded by low levels of health literacy and limited access to regular blood pressure screening—factors that have been implicated in delayed diagnosis and poor disease management[8]. The examination of both glucose and cholesterol is essential for preventing adverse outcomes in hypertensive patients. Current guidelines recommend regular checks of blood sugar levels in people with high blood pressure, particularly those with other risk factors, because finding glucose intolerance early can help reduce the risk of heart problems[9]. Additionally, tailored management strategies, including lifestyle modifications and pharmacological interventions aimed at improving both glucose metabolism and lipid profiles, can significantly impact clinical outcomes in this population.

According to the description above, blood pressure measurement and risk factors for metabolic syndrome are crucial for people with hypertension. The state of the cardiovascular systems can be predicted by routine examinations. Through community service carried out by the Faculty of Medicine and Health Sciences, Jambi University, blood pressure screening and blood chemistry testing are useful for early detection of risk factors for cardiovascular and cerebrovascular disease. The aim of this study was to determine the risk factors for metabolic syndrome in hypertensive patients by examining their blood levels of cholesterol, glucose, and uric acid.

METHODS

This study was conducted using data from community service projects at the olak kemang health centre, which is part of jambi university's faculty of medicine and health sciences. Participants in this project were routine patients of olak kemang health center. All participants had their blood pressure, cholesterol, glucose, and uric acid levels examined after fasting for at least 8 hours. Based on The Seventh Report of The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7), hypertension is classified into normal (systolic < 120 mmhg/diastolic 80 mmhg), prehypertension (systolic 120–139 mmhg/diastolic 80–89 mmhg), prehypertension, hypertension stage 1 (systolic 140–159 mmhg/diastolic 90–99 mmhg), and hypertension stage 2 (systolic 160–179 mmhg/diastolic 100–109 mmhg)[10]. A rapid testing tool was employed to assess blood chemistry levels. Hyperlipidemia is characterized by fasting cholesterol levels exceeding 200 mg/dl, hyperglycemia by fasting glucose levels exceeding 126 mg/dl, and hyperuricemia by uric acid levels exceeding 7 mg/dl in men and 6 mg/dl in women[11,12].

RESULTS AND DISCUSSION

64 participants participated in the community service project at the Olak Kemang Health Center, but only 44 of them underwent blood pressure and blood tests. In this study, it was found that most of the participants who attended the activity were women aged 46–55 who were included in the early elderly category (38.6%). All participants had their blood pressure measured, and the majority had normal blood pressure (31.8%).

According to the results of the blood tests, it was found that 7 people (15.9%) had hyperlipidemia, 9 people (20.4%) had hyperglycemia, and 4 people (9%) had hyperuricemia **(Table 1).**

Table1. Characteristics of participants community service in Olak Kemang Health Center

Characteristic	Frequency (n)	Percentage (%)
Age		
17-25	1	2.3
26-35	4	9.1
36-45	16	36.4
46-55	17	38.6
56-65	5	11.4
>65	1	2.3
Gender		
Male	2	4.5
Female	42	95.4
Blood Pressure		
Normal	14	31.8
Pre Hypertensi	7	15.9
Hypertensi Stage 1	12	27.3
Hypertensi Stage 2	11	25
Cholesterol level		
Normal	37	84.1
Hyperlipidemia	7	15.9
Glucosa level		
Normal	35	79.6
Hyperglicemia	9	20.4
Uric Acid level		
Normal	40	91
Hyperuricemia	4	9

Table 2 showed the distribution of participants' blood pressure based on age. From the univariate analysis, it was found that the most hypertension sufferers were in the age range of 46–55 years where 9 patients had stage 2 hypertension, 2 people had stage 1 hypertension, and 5 people had pre-hypertension. **Table 3** showed the distribution of participants' blood test results based on blood pressure. The analysis results found that 8 participants in the stage 1 hypertension group suffered an increase in clinical blood chemistry results, including 2 people with hyperlipidemia, 4 people with hyperglycaemia, and 2 people with hyperuricaemia.

Table 2. Age-related blood pressure characteristics

Age (years)	Blood Pressure (n/%)			
	Normal	Pre hypertension	Hypertension stage 1	Hypertension stage 2
17-25	1 (2.3)	0	0	0
26-35	4 (9.1)	0	0	0
36-45	8 (18.1)	2 (4.5)	6 (13.6)	0
46-55	1 (2.3)	5 (11.3)	2 (4.5)	9 (20.4)
56-65	0	0	4 (9.1)	1 (2.3)
>65	0	0	0	1 (2.3)
Total	14	7	12	11

Table 3. Blood pressure related blood chemistery testing

Blood sure	Cholesterol level (n/%)		Glucose level (n/%)		Uric acid level(n/%)	
	Normal	Hyperlipidemia	Normal	Hyperglicemia	Normal	Hyperuricemia
Normal	12 (27.3)	2 (4.5)	12 (27.3)	2(4.5)	13 (29.5)	1 (2.3)
Pre hypertension	4 (9.1)	3 (6.8)	5 (11.4)	2 (4.5)	7 (15.9)	0
Hypertension Stage 1	10 (22.7)	2 (4.5)	8 (18.2)	4 (9.1)	10 (22.7)	2 (4.5)
Hypertension Stage 2	11 (25)	0	10 (22.7)	1 (2.3)	10 (22.7)	1 (2.3)
Total	37	7	35	9	40	4

This study found that the incidence of hypertension increases according to age and the blood chemistry levels increase in participants with hypertension. There are 8 participants in the stage I hypertension group who suffered hyperlipidemia (4.5%), hyperglycemia (9.1%), and hyperuricemia (4.5%). Higher blood pressure levels, especially isolated systolic hypertension, are a hallmark of hypertension in the elderly, a complex and increasingly common clinical illness that significantly increases cardiovascular morbidity and mortality. According to Zendrato et al., the epidemiology of hypertension in the elderly demonstrates that prevalence rises with age[13]. For instance, data from Riskesdas 2018 shows that the prevalence of hypertension in older adults is approximately 31.9%, whereas in younger adults it is 21.2%. Moreover, degenerative diseases including hypertension, hyperlipidemia, and hyperglycemia are more common as people age, making it more difficult to control this population[14].

The pathophysiology of hypertension in the context of aging is predominantly driven by progressive vascular remodeling, which manifests primarily as increased arterial stiffness. With advancing age, structural changes occur in the arterial wall, including fragmentation and degradation of elastin fibers accompanied by collagen deposition. These alterations result in increased pulse wave velocity and decreased arterial distensibility, which raise systolic blood pressure and cause isolated systolic hypertension[15,16]. Decreased renal function, neurohormonal and autonomic dysregulation, and mechanical hemodynamic changes are other underlying causes of hypertension in the elderly. Hemodynamic mechanical alterations that modify wave reflection result in a decrease in aortic elasticity and a loss of diastolic recoil. Both pulse pressure and pulse-wave velocity have increased as well. The central systolic blood pressure is further raised by the increase in reflected pressure waves that are added to the forward pressure waves in the ascending aorta due to the alteration in arterial anatomy[17]. If left untreated, this mechanism presents risks to both the cardiovascular and cerebrovascular systems, as the ongoing vasoconstriction of cerebral blood vessels heightens the probability of cerebral small vessel disease[18].

The interplay among hyperlipidemia, aging, and hypertension illustrates a multifactorial relationship that contributes significantly to cardiovascular risk. Epidemiological data indicate that the prevalence of hyperlipidemia increases with age, with incidence rates rising markedly among individuals aged 50 to 69 years. Xing *et al*. reported that hyperlipidemia, defined by elevated triglycerides and cholesterol levels, becomes increasingly common with age, underscoring that aging processes and related metabolic changes predispose individuals to dyslipidemia. In summary, the evidence supports that aging is associated with an increased incidence of hyperlipidemia, which in turn is intertwined with hypertension through shared metabolic disturbances, endothelial dysfunction, and inflammatory processes. The coexistence of these conditions, especially in older adults, contributes to poorer blood pressure control and an elevated risk of adverse cardiovascular events. The preventive strategies, such as dietary modifications and targeted lifestyle interventions, may be essential to mitigate this dual burden and improve long-term cardiovascular outcomes[19]. Clinically, the association between hyperglycemia and hypertension carries significant implications for disease management. Data derived from large-scale surveys, such as those analyzing the "three highs" (hypertension, hyperlipidemia, and hyperglycemia), reveal that these conditions often cluster, particularly in aging populations, thereby complicating treatment strategies[20]. Moreover, research involving oral glucose tolerance

testing in hypertensive individuals has demonstrated that impaired glucose regulation is linked with altered arterial stiffness and exacerbated blood pressure profiles, suggesting that abnormalities in glucose metabolism may directly impact the vascular system[21,22]. Treatment paradigms that concurrently target insulin resistance and hypertension may offer superior benefits over strategies focused solely on blood pressure reduction[23].

Additionally, a number of risk variables, both modifiable and non-modifiable, affect the development and course of hypertension in the elderly. In this age range, lifestyle variables such as obesity, poor diet, and insufficient physical exercise are important predictors of hypertension. It's crucial to manage hypertension in older individuals, but it can be difficult because of other medical issues and medication sensitivity. The keys to lowering risks and enhancing quality of life include adequate treatment, frequent monitoring, and lifestyle modifications[24]. Over the last few decades, hypertension in middle-aged and young adults has become a major global public health concern. Furthermore, if detected early, lifestyle changes may help reduce prehypertension, which is more prevalent in youth than full-blown hypertension and is a significant risk factor for hypertension and cardiovascular disease. Doctors are less likely to recommend antihypertensive medications to young individuals with hypertension than to older patients, although young people are underscreened for prehypertension and hypertension. Additionally, lowering risk factors can help avoid hypertension and achieve better blood pressure control, making this a crucial strategy[25].

CONCLUSION

Research conducted at the Olak Kemang Health Center through community service initiatives identified seven people with pre-hypertension, twelve with stage 1 hypertension, and eleven with stage 2 hypertension. The majority of participants with hypertension were aged 46 to 55. Four patients exhibited elevated uric acid levels, nine displayed raised blood glucose levels, and seven presented elevated cholesterol levels. In summary, the importance of examining glucose, cholesterol, and uric acid levels in hypertensive patients stems from their significant role as risk factors for cardiovascular disease. Their interrelationship underlines the necessity for integrated management strategies to enhance patient care and mitigate future complications.

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