

Abstract

Hypertension In Patients Who Admitted To The Emergency Unit Of The Indonesian Christian University General Hospital 2017

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Hypertension is a common risk factor for cardiovascular disease. Based on JNC VII, hypertension is defined as condition of systolic blood pressure greater than or equal to 140 mmHg or diastolic blood pressure greater than or equal to 90 mmHg. In developed countries, the prevalence of hypertension in man 35.9%, woman 37.2%. According to Riskesdas 2013, prevalence of hypertension in Indonesia at age ≥ 18 year equal to 25,8%. Only 36.8% detected by health workers, 63.2% cases of hypertension in the community are undiagnosed. The prevalence of DM, hyperthyroidism and hypertension in women tends to be higher than in men.¹ Based on the results of our research on patients entered to the UKI General Hospital during January-November 2017, patients diagnosed with hypertension were 81 people. Patient with only hypertension-diagnosed were 49 people. Hypertension and CKD 7 people. Hypertension and DM 12 people. Hypertension with CHD 5 people, and Hypertension with Stroke 1 person. Patient with hypertension and CKD and DM were found 5 people. Hypertension with CKD and CHD 1 person, Hypertension with CKD and Stroke not founded. Hypertension and DM and CHD 1 person, Hypertension and DM and Stroke not founded. Hypertension with CHD and Stroke is also not founded.

Keyword: Hypertension, CKD, DM, CHD, Stroke

INTRODUCTION

Hypertension is a contributing factor for many other diseases including myocardial infarction (MI), stroke, heart failure, kidney failure, and retinopathy, and is a major cause of death. In 2004, an estimated 55,000 deaths were directly attributable to hypertension, and it is considered to be a factor underlying or contributing to at least 300,000. ¹

Awareness, treatment, and control of hypertension is suboptimal. Only two-thirds of patients with hypertension are aware of their status, which means that a large segment of the population has untreated and untreated hypertension. Even in patients with known hypertension, some are not treated for various reasons, including doctors and patients under the recognition of the importance of treatment. Even with treatment, blood pressure control can be difficult, with only one-third of treated hypertension having a systolic blood pressure [SBP] of less than 140 mm Hg. ²

In 2003, the National Committee on the Joint Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC) published its seventh report (JNC) 7,

(2) with guidelines for care. It introduces important changes in the categorization and definition of hypertension, and recommends several pharmacologic and lifestyle-based strategies for treatment. New guidelines are expected in 2009, and in order to understand upcoming recommendations and changes, it is important to review and review JNC 7.

A. Definition

Hypertension is a manifestation of hemodynamic balance disorders of the cardiovascular system, in which the pathophysiology is multifactorial so that it cannot be explained by only one single mechanism. many of these factors involve genetic, environmental and hemodynamic regulatory centers. If simplified, hypertension is the interaction of cardiac

out (CO) and total peripheral resistance (TPR). So Hypertension is blood pressure that is higher than normal numbers, where the number is persistently above or equal to 140/90 mmHg. 1 Definition of Hypertension In the JNC 7 guideline, the 7 blood pressure categories defined in JNC 6 are simplified and reduced to 4 categories (Tables 1 and 2): • Normal blood pressure: SBP 120 mm Hg and diastolic blood pressure (DBP) <80 mm Hg • Prehypertension: These are patients who have hypertension. Defined as SBP 120-139 mm Hg or DBP 80-89 mm Hg Stage I hypertension: SBP 140-159 mm Hg or DBP 90-99 mm Hg Stage II hypertension: SBP 160 mm Hg or DBP 100 mm Hg ² .

B. Classification

Almost all consensus or main guidelines, both from within and outside the country, state that a person will be considered hypertensive if they have systolic blood pressure ≥ 140 mmHg and / or diastolic blood pressure ≥ 90 mmHg, on repeated examinations. Systolic blood pressure is the main measurement on which to determine the diagnosis of hypertension. The division of the degree or severity classification of hypertension in a person is one of the bases for determining hypertension management.

Table 1. Classification of Hypertension according to the ESH / ESC Guidelines ³

Category	Systolic		Diastolic
Optimal	<120	and	<80
Normal	120-129	and/or	80-84
High normal	130-139	and/or	85-89
Grade 1 hypertension	140-159	and/or	90-99
Grade 1 hypertension	160-179	and/or	100-109
Grade 1 hypertension	≥ 180	and/or	≥ 110
Isolated systolic hypertension	≥ 140	and	<90

³The blood pressure (BP) category is defined by the highest level of BP, whether systolic or diastolic. Isolated systolic hypertension should be graded 1,2, or 3 according to systolic BP values in ranges indicated

Table 2. Classification of Hypertension according to JNC VII ⁴

BP CLASSIFICATION	SBP* MMHg	DBP* MMHg	LIFESTYLE MODIFICATION	INITIAL DRUG THERAPY	
				WITHOUT COMPELLING INDICATION	WITH COMPELLING INDICATIONS (SEE TABLE 8)
NORMAL	<120	and <80	Encourage		
PREHYPERTENSION	120–139	or 80–89	Yes	No antihypertensive drug indicated.	Drug(s) for compelling indications.‡
STAGE 1 HYPERTENSION	140–159	or 90–99	Yes	Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination.	Drug(s) for the compelling indications.‡ Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.
STAGE 2 HYPERTENSION	≥160	or ≥100	Yes	Two-drug combination for most† (usually thiazide-type diuretic and ACEI or ARB or BB or CCB).	

DBP, diastolic blood pressure; SBP, systolic blood pressure.

Drug abbreviations: ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; BB, beta-blocker; CCB, calcium channel blocker.

* Treatment determined by highest BP category.

† Initial combined therapy should be used cautiously in those at risk for orthostatic hypotension.

‡ Treat patients with chronic kidney disease or diabetes to BP goal of <130/80 mmHg.

C. Factors that influence the occurrence of hypertension

Hypertension is a multifactorial disease that arises because of the interaction of various factors. With increasing age, blood pressure

will also increase. After the age of 45 years, the artery walls will experience thickening due to a buildup of collagen in the muscle layer, so that the blood vessels will gradually narrow and become stiff. Systolic blood pressure increases because the flexibility of large blood vessels decreases with increasing age until the last decade while the diastolic pressure increases until the fifth and sixth then persists or tends to decrease. Increasing age will cause some physiological changes, in the elderly there is an increase in peripheral resistance and sympathetic activity. The sensitivity of the baroreceptor reflex blood pressure in

the elderly has decreased, while the role of the kidneys has also decreased where renal blood flow and glomerular filtration rate decrease. ⁵

Uncontrolled hypertension will cause various complications, if it affects the heart it is possible to have myocardial infarction, coronary heart disease, congestive heart failure, if it affects the brain there is a stroke, hypertensive encephalopathy, and if it affects the kidneys there is chronic renal failure, whereas if it affects the eye there will be retinopathy hypertensive. Of the various complications that may arise, it is a very serious disease and has an impact on the patient's psychology because the quality of life is low, especially in cases of stroke, kidney failure and heart failure. ⁶

In general, hypertension does not have a specific cause. Hypertension occurs in response to increased cardiac output or

increased peripheral pressure. However, there are several factors that influence the occurrence of hypertension, including:

1. Genetics: the presence of genetic factors in certain families will cause that family to have the risk of suffering from hypertension. This is associated with increased intracellular sodium levels and a low ratio of potassium to sodium. Individuals with elderly people with hypertension have a two times greater risk of suffering from hypertension than people who do not have a family history of hypertension.

(6) In addition, there are 70-80% cases of essential hypertension with a family history of hypertension ⁷

2. Obesity: body weight is a determinant factor in blood pressure in most ethnic groups at all ages. According to the National Institutes for Health USA (NIH, 1998), the prevalence of high blood pressure in people with a Body Mass Index (BMI) > 30 (obesity) is 38% for men and 32% for women, compared with a prevalence of 18% for men and 17% for women who have a BMI < 25 (normal nutritional status according to international standards). ⁸

According to Hall (1994) physiological changes can explain the relationship between being overweight and blood pressure, namely the occurrence of insulin resistance and hyperinsulinemia, activation of the sympathetic nerves and the renin-angiotensin system, and physical changes in the kidneys. ⁹

3. Gender: the incidence of hypertension in men is the same as in women. However, women are protected from cardiovascular disease before menopause, one of which is coronary heart disease. (9)

Women who have not yet experienced menopause are protected by the hormone estrogen which plays a role in increasing

the levels of High Density Lipoprotein (HDL). High levels of HDL cholesterol are a protective factor

in preventing the atherosclerosis process. The protective effect of estrogen as an explanation for the immunity of women in premenopausal ages. In premenopause women begin to lose a little bit of the hormone estrogen which has been protecting blood vessels from damage. This process continues where the hormone estrogen changes in quantity according to a woman's age naturally, which generally begins to occur in women aged 45-55 years. ¹⁰

4. Stress: stress can increase blood pressure at any time. The hormone adrenaline will increase when we are stressed, and it can cause the heart to pump blood faster so that blood pressure increases. ¹⁰

5. Lack of exercise: exercise is associated with the management of non-communicable diseases, because regular and isotonic exercise can reduce peripheral resistance which will lower blood pressure (for hypertension) and train the heart muscle so that it becomes accustomed when the heart has to do heavier work due to conditions. Lack of physical activity increases the risk of high blood pressure because of the increased risk of becoming obese. People who are inactive tend to have a faster heart rate and their heart muscles have to work harder with each contraction, the harder and more often the heart has to pump the more force is pressing on the arteries. . . ⁸.

6. Smoking Habits: smoking causes increased BLOOD pressure . Heavy smoking can be associated with an increased incidence of malignant hypertension and the risk of developing atherosclerotic renal artery stenosis. ¹¹

A. Pathophysiology of Hypertension

Blood pressure is influenced by stroke volume and total peripheral resistance. If there is an increase in one of these variables which is not compensated for, it can cause hypertension. The body has a system that functions to prevent acute changes in blood pressure caused by circulatory disorders and to maintain blood pressure stability in the long term.

Sistem pengendalian tekanan darah sangat kompleks. Pengendalian dimulai dari sistem reaksi cepat seperti reflex kardiovaskuler melalui sistem saraf, refleks kemoreseptor, respon iskemia, susunan saraf pusat yang berasal dari atrium, dan arteri pulmonalis otot polos. Sedangkan sistem pengendalian reaksi lambat melalui perpindahan cairan antara sirkulasi kapiler dan rongga interstisial yang dikontrol oleh hormon angiotensin dan vasopresin. Kemudian dilanjutkan sistem poten dan berlangsung dalam jangka panjang yang dipertahankan oleh sistem pengaturan jumlah cairan tubuh yang melibatkan berbagai organ.¹²

The mechanism of hypertension is through the formation of angiotensin II from angiotensin I by angiotensin I converting enzyme (ACE). ACE plays an important physiological role in regulating blood pressure. Blood contains angiotensinogen which is produced in the liver. Furthermore, by the hormone, renin (produced by the kidneys) will be converted into angiotensin I. By ACE in the lungs, angiotensin I is converted into angiotensin II. Angiotensin II

has a key role in increasing blood pressure through two main actions.

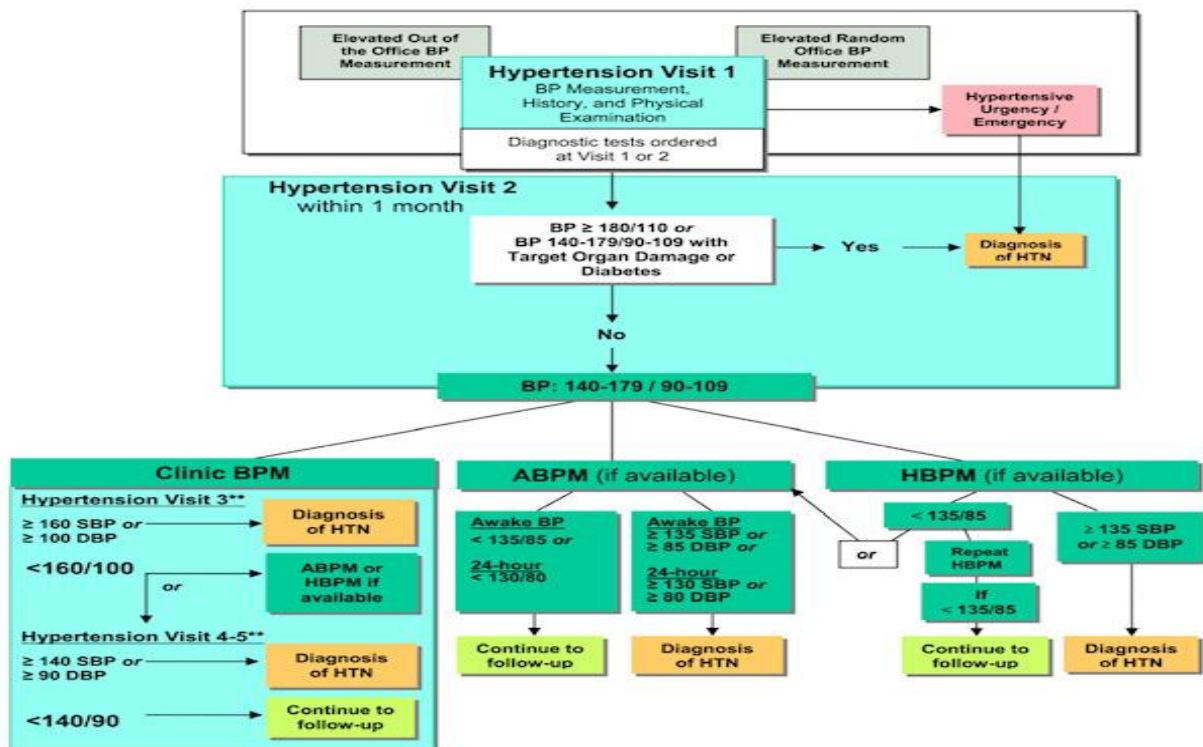
The first action is to increase the secretion of the antidiuretic hormone (ADH) and thirst. ADH is produced in the hypothalamus (pituitary gland) and acts on the kidneys to regulate osmolality and urine volume. With an increase in ADH, very little urine is excreted outside the body (antidiuresis), so it becomes concentrated and high in osmolality. To dilute it, the volume of extracellular fluid will be increased.¹⁴

by drawing fluid from the intracellular part. As a result, blood volume increases which in turn increases blood pressure.¹³

The second action is to stimulate aldosterone secretion from the adrenal cortex. Aldosterone is a steroid hormone that plays an important role in the kidneys. To regulate the volume of extracellular fluid, aldosterone will reduce the excretion of NaCl (salt) by reabsorption from the renal tubule. Increasing the concentration of NaCl will be diluted again by increasing the volume of extracellular fluid which in turn will increase the volume and blood pressure.¹⁴

B. Diagnosis of Hypertension

In establishing a diagnosis of hypertension, several stages of examination are required before determining the therapy or management to be taken. This diagnostic algorithm is adapted from the Canadian Hypertension Education Program. The Canadian Recommendation for The Management of Hypertension 2014. .¹⁵



HBPM : Home Blood Pressure Monitoring

ABPM : Ambulatory Blood Pressure Monitoring

Figure 1. Diagnosis of Hypertension ¹⁵

C. Management of Hypertension

Treatment of hypertension according to JNC VII aims to reduce the morbidity and mortality rates of cardiovascular and kidney diseases. The main focus in the management of hypertension is achieving a target systolic pressure <140/90 mmHg. In patients with hypertension and diabetes or kidney disease, the target blood pressure is <130/80 mmHg.

Achieving target blood pressure in general can be done in two ways as follows: ⁵

a. Non Pharmacological

Non-pharmacological therapy consists of stopping smoking, losing excess weight, consuming excess alcohol, intake of salt and fat intake, physical exercise and increasing consumption of fruits and vegetables. Lose

weight when nutritional status is overweight: increasing body weight in adulthood greatly affects blood pressure. Therefore, weight management is very important in the prevention and control of hypertension. ¹⁶

- Increase physical activity: people who have low activity risk of developing hypertension 30-50% than those who are active. Therefore, physical activity between 30-45 minutes as much as > 3 times / day is important as primary prevention of hypertension. ⁴
- Reducing sodium intake
- Reducing the consumption of caffeine and alcohol: caffeine can make the heart work faster, so that more fluid flows per second. Meanwhile, alcohol consumption of more than 2-3 glasses / day can increase the risk of hypertension

b. Pharmacological Therapy

Pharmacological therapy is an antihypertensive drug recommended by JNC VII, namely diuretics, especially thiazide (Thiaz) or aldosterone antagonists, beta blockers, calcium channel blockers or calcium antagonists, Angiotensin Converting Enzyme Inhibitor (ACEI), Angiotensin II Receptor Blocker or AT1 receptor antagonist / thiazide diuretic blockers (ARBs) (eg bendroflumetiazide).¹⁷

The examples of anti-hypertensive drugs include:

1. Beta-blocker, (for example propranolol, atenolol),
2. Inhibitor angiotensin converting enzymes (eg captopril, enalapril),
3. Angiotensin II antagonists (eg candesartan, losartan),
4. Calcium channel blockers (eg amlodipine, nifedipine)
5. Alpha-blockers (eg doksasozin). Less commonly used is a vasodilator and centrally acting antihypertensive and less frequently used, guanetidine, which is indicated for hypertensive crises.

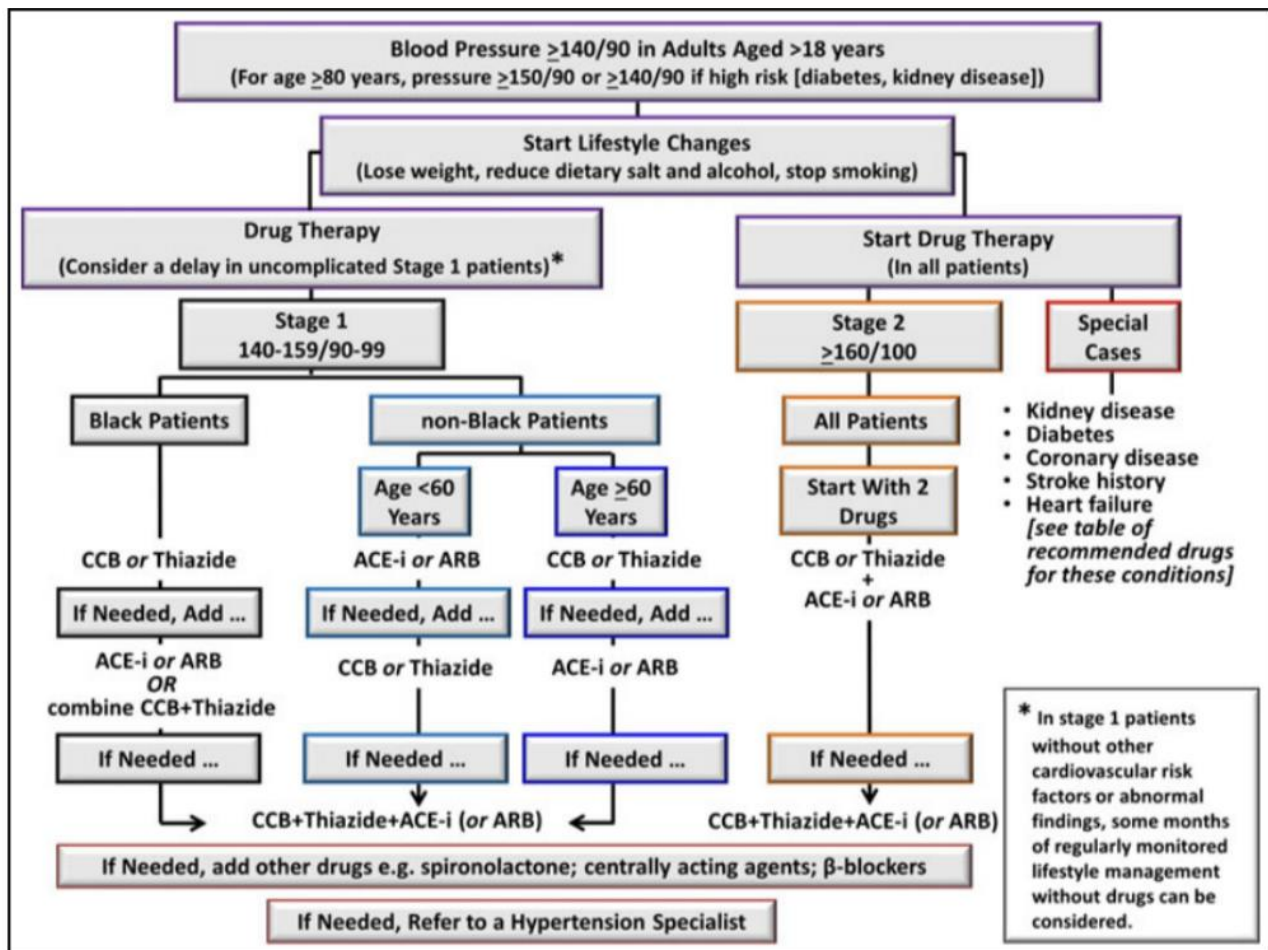


Figure 2. Management of Hypertension¹¹

D. Complications

Hypertension is a major risk factor for heart disease, congestive heart failure, stroke, vision problems and kidney disease. High blood pressure generally increases the risk of these complications. Untreated hypertension will affect all organ systems and ultimately shorten life expectancy by 10-20 years .¹⁸

Mortality in hypertensive patients is faster if the disease is not controlled and has caused complications to several vital organs. Causes of death that often occur are heart disease with or without stroke and kidney failure. Complications that occur in mild and moderate hypertension affect the eyes, kidneys, heart and brain. In the eye in the form of retinal bleeding, visual disturbances to blindness.¹⁹

1. Brain

Stroke is damage to target organs in the brain caused by hypertension. Stroke occurs due to bleeding, increased intracranial pressure, or the result of an embolus detaching from non-brain vessels exposed to high pressure. Stroke can occur in chronic hypertension if the arteries that supply the brain are hypertrophied or thickened, so that blood flow to the areas that it bleeds is reduced.²⁰

2. Cardiovascular

Myocardial infarction can occur when the coronary arteries experience atherosclerosis or if a thrombus is formed that blocks blood

flow through these blood vessels, so that the myocardium does not get an adequate supply of oxygen. Myocardial oxygen demand that is not met leads to cardiac ischemia, which in turn can lead to infarction.²¹

3. Kidneys

Chronic kidney disease can occur due to progressive damage due to high pressure on the renal capillaries and glomerulus. Damage to the glomerulus will cause blood to flow to the functional units of the kidney, so that the nephrons will be disrupted and lead to hypoxia and kidney death. Damage to the glomerular membrane will also cause protein to pass through the urine so that edema is often seen as a result of reduced plasma colloid osmotic pressure. This is especially true in chronic hypertension.²¹

4. Retinopathy

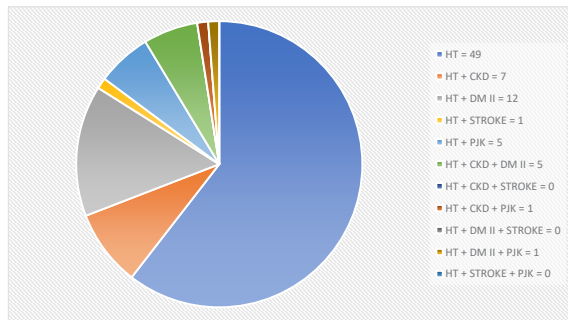
High blood pressure can cause damage to the blood vessels in the retina. The higher the blood pressure and the longer the hypertension lasts, the more damage it can cause. Other abnormalities in the retina that occur due to high blood pressure are optic ischemic neuropathy or damage to the nerves of the eye due to poor blood flow, occlusion of the retinal arteries and veins due to obstruction of blood flow to the retinal arteries and veins. Patients with hypertensive retinopathy initially show no symptoms, which can eventually lead to blindness in the late stages.

E. Research Results and Discussion

Table 3.Hypertension Data in the IGD UKI Hospital January - November 2017

CAD/Valve/arytmia	Stroke	HT	CKD		DM		Total	
					No	yes		
no	no	Yes	CKD	no	49	12	61	
				Yes	7	5	12	
			Total	56	17	73		
		Total	CKD	no	49	12	61	
				yes	7	5	12	
			Total	56	17	73		
	yes	Yes	CKD	no	1		1	
				Total	1		1	
			Total	CKD	no	1		1
		Total			1		1	
		Total		YA	CKD	no	50	12
			yes		7	5	12	
	Total		57	17	74			
	ya	no	Yes	CKD	no	5	1	6
					yes	1	0	1
				Total	6	1	7	
Total			CKD	no	5	1	6	
				yes	1	0	1	
			Total	6	1	7		
ya	no	Yes	CKD	no	5	1	6	
				yes	1	0	1	
			Total	6	1	7		
		Total	CKD	no	5	1	6	
				yes	1	0	1	
			Total	6	1	7		

Diagram 1. Incidence of Hypertension in IGD UKI Hospital January - November 2017



Based on the results of a prospective analysis of the incidence of hypertension patients in the ER at UKI Hospital which was carried out by collecting secondary data, namely medical records from January to November 2017. Patients who came to the ER RSUKI with hypertension were 81 patients. The highest incidence of hypertension was obtained in September with a total of 15 patients and the lowest in November as many as 2 people.

In addition to the data described above, 49 patients with a single diagnosis of hypertension were also obtained, 12 people with hypertension with diabetes mellitus, 7 people with hypertension with chronic kidney disease, 5 with hypertension with coronary heart disease, 1 hypertension with stroke, 1 hypertension with chronic kidney disease and diabetes mellitus as many as 5 people, hypertension with chronic kidney disease and stroke there were no patients, hypertension with chronic kidney disease and coronary heart disease 1 person, hypertension with diabetes mellitus and stroke there was no patient, hypertension with diabetes mellitus and coronary heart disease 1 person and finally hypertension with stroke and coronary heart disease in no patient.

Based on the theory above, diabetes mellitus is one of the major risk factors and is a high risk factor for hypertension, and from

the incidence rate in January - November 2017, there are around 12 people who have hypertension with diabetes mellitus. Diabetes mellitus causes an increase in the viscosity of the blood so that the heart contracts to pump blood to the tissues increases, this impact will increase blood pressure.

F. Conclusion

Based on the results of research conducted at the UKI Hospital Emergency Room from January-November 2017, it can be concluded as follows: Hypertension occurs due to multiple factors so that it cannot be explained by only one single mechanism. on another factor.

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