RELATIONSHIP BETWEEN POTENTIAL RISK FACTOR AND HYPERTENSION IN SANGLAH HOSPITAL DENPASAR BALI

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Abstract: **Blood pressure is an important factor to maintain the homeostatic balance in the human body. If the level of blood pressure is increased above it's normal limit, it will result on hypertension. Hypertension itself is a manifestation of a disturbance in the homeostatic balance of the cardiovascular system. The pathophysiology is multifactor, which ranges from age, gender, obesity, family history along with several cardiovascular-metabolic disease which often accompany hypertension. The goal for this research is to find the relation between the potential risk factor and hypertension of the policlinic patient in Sanglah hospital. This research is an observational research using the analytical cross-sectional study. Data were analyzed using chi-square test with p value <0.005 for significance. This research is done by collecting data primarily via blood pressure measurement and direct interview with the patient, secondarily via patient's medical record. According to the research result, it was found that the proportion of hypertension within the internal medicine polyclinic is at 52%. It was also found that there is a significant relation between ages (p=0.001), obesity(p=0.001), smoking (p=0.000), family history (p=0.000) and hypertension, also it was found that gender has no relation with hypertension (p=0.255). Hypertension also has relationship with *Diabetes mellitus* (p=0.004), hypertensive heart disease (p=0.020) and chronic kidney disease (p=0.001).**

Keywords: **hypertension, risk factors, Sanglah Hospital**.

I. INTRODUCTION

The prevalence of hypertension has been rising over years. An increase in life expectancy which subsequently increases the elderly population is one of the causes of this burden. Based on data from WHO, one third of adults suffer from high blood pressure globally.[1] Hypertension is still an ongoing health problem that needs the attention of general population, considering the long term effect and complication that may be caused by this problem. According to data from *Riset Kesehatan Dasar*, prevalence of hypertension in Indonesia for population aged 18 and older in 2007 was 31.7%. Furthermore, based on province area, this research data showed that prevalence of hypertension was highest in South Kalimantan (39.6%) and lowest in West Papua (20.1%). Compared to 2013, there is a reduction of 5.9% (from 31.7% to 25.8%). [2] Hypertension is caused by disruption in hemodynamic balance of cardiovascular system and the course of this disease is said to be multi factorial. There are several definitions and classifications of hypertension. Blood pressure of 140/90 mmHg or higher are considered as hypertension.[3] Based on the etiology, hypertension or high blood pressure may be classified into primary and secondary. Primary hypertension is hypertension of unknown cause, or often called as idiopathic hypertension. Secondary hypertension is hypertension with specific identified causes.[4] There are numerous complications of hypertension, from renal to even cardiac problem that may lead to death.[5] Being aware of the risk factor for hypertension is a preventable measure that can be done regarding the complication. Risk factor can be divided into two, modifiable and non-modifiable. Modifiable risk factor includes obesity, smoking and others; meanwhile non-modifiable risk factor includes gender, age, and family history. Hypertension may be associated with other co-morbidities such as diabetes mellitus, chronic kidney disease and hypertensive heart disease. These condition are said to have a strong correlation with hypertension according to former studies.[6,7,8] To identify how strong the correlation between potential

risk factors and hypertension and to identify association between hypertension and metabolic cardiovascular disease, researcher found an importance to conduct an analytical study in patient visiting policlinic of Internal Medicine, Sanglah General Hospital, Bali.

II.   MATERIAL AND METHODS

This study was an analytical study with cross-sectional design to investigate the association of hypertensive status in patient who visited Internal Medicine policlinic of Sanglah General Hospital with potential risk factor for hypertension and metabolic cardiovascular disease co-morbidities. Risk factors were divided into modifiable (obesity and smoking) and non-modifiable (age, gender, family history). Metabolic cardiovascular disease co-morbidities consisted of diabetes mellitus, hypertensive heart disease, and chronic kidney disease. Study was done by consecutive sampling. This research involved individuals aged 18 or older with hypertension who visited Internal Medicine outpatient clinic of Sanglah General Hospital in 2016. Sample size requirement was calculated by multiplying 15 with each number of hypotheses made by researcher. The calculation resulted in a minimum of 120 samples required. This study was done with a total participant of 123 individuals.

Primary data were obtained by means of anamnesis, questionnaire and blood pressure measurement with Omron HEM-7203 Digital Sphygmomanometer. Secondary data obtained from medical records of patients. Data were collected and analyzed with bivariate statistical analysis using chi-square test with SPSS computer software to represent results according to aims of the study.

III.   RESULT AND DISCUSSION

A. Result

Prevalence of Hypertension

Blood pressure measurement was done in 123 samples. It was found that samples with hypertension were greater in number compared to samples without hypertension.

Table 1. Proportion of Hypertension and Non-hypertension Group at Internal Medicine policlinic of Sanglah General Hospital in 2016 (n=123)

Hipertensive status	Frequency	Percentage (%)
Hipertensive	64	52
Non-hipertensive	59	48
Total	123	100

Table 1 shows that 64 (52%) subjects suffered from hypertension, while subjects without hypertension only accounted for 59 (49%) of total subjects. This result showed that prevalence of hypertension in Internal Medicine Policlinic of Sanglah General Hospital was 52%.

Statistical Analysis for Association between Potential Risk Factors and Hypertension

Statistical analysis was done to identify relation of hypertension with potential risk factor variables including age, gender, smoking, obesity, family history and to identify relation of hypertension with metabolic cardiovascular diseases. Each analytical data is shown in Table 2 to Table 9.

Table 2. Distribution of Sample based on Age in Hypertension Group and Non- hypertension Group at Internal Medicine Policlinic of Sanglah General Hospital in 2016 (n=123)

Variable Age	Hypertension status				Total		P Value	OR (95%CI)
	Hypertension		Non-hypertension					
	N	%	N	%	N	%		
-$\leq$40 years old	5	20.8	19	79.2	24	100		
->40 years old	59	59.6	40	40.4	99	100		
Total	64	52.0	59	48.0	123	100	0.001	0.178 (0.62-0.517)

Table 3. Distribution of Sample based on Gender in Hipertension Group and Non- hypertension Group at Internal Medicine Policlinic of Sanglah General Hospital in 2016 (n=123)

Variable	Hypertension status				Total		P Value	OR
	Hypertension		Non-hypertension					(95%CI)
Gender	N	%	N	%	N	%		
-Male	38	56.7	29	43.3	67	100		
-Female	26	46.4	30	53.6	56	100		
Total	64	52.0	59	48.0	123	100	0.255	1.512 (0.741-3.087)

Table 4. Distribution of Sample based on Smoking Habit in Hypertension Group and Non-hypertension Group at Internal Medicine Policlinic of Sanglah General Hospital in 2016 (n=123)

Variable	Hypertension status				Total		P Value	OR
	Hypertension		Non-hypertension					(95%CI)
Smoking	N	%	N	%	N	%		
-Yes	19	86.4	3	13.6	22	100		
-No	45	44.6	56	55.4	101	100		
Total	64	52.0	59	48.0	123	100	0.000	7.881 (2.193- 28.327)

Table 5. Distribution of Sample based on Obesity Status in Hypertension Group and Non-hypertension Group at Internal Medicine Policlinic of Sanglah General Hospital in 2016 (n=123)

Variable	Hypertension status				Total		P Value	OR
	Hypertension		Non-hypertension					(95%CI)
Obesity	N	%	N	%	N	%		
-Yes	21	80.8	5	19.2	26	100		
-No	43	44.3	54	55.7	97	100		
Total	64	52.0	59	48.0	123	100	0.001	5.274 (1.838-15.138)

Table 6. Distribution of Sample based on Family History in Hypertension Group and Non-hypertension Group at Internal Medicine Policlinic of Sanglah General Hospital in 2016 (n=123)

Variable	Hypertension status				Total		P Value	OR
	Hypertension		Non-hypertension					(95%CI)
Family History	N	%	N	%	N	%		
-Yes	41	91.1	4	8.9	45	100		
-No	23	29.5	55	70.5	78	100		
Total	64	52.0	59	48.0	123	100	0.000	24.511 (7.869-76.348)

Table 7. Distribution of Sample based on Diabetes Mellitus Disease in Hypertension Group and Non-hypertension Group at Internal Medicine Policlinic of Sanglah General Hospital in 2016 (n=123)

Variable	Diabetes Mellitus				Total		P Value	OR
	Yes		No					(95%CI)
Hypertension	N	%	N	%	N	%		
-Yes	17	26.6	47	73.4	64	100		
-No	4	6.8	55	93.2	59	100		
Total	21	17.1	102	82.9	123	100	0.004	4.973 (1.564-15.812)

Table 8. Distribution of Sample based on Chronic Kidney Disease in Hypertension Group and Non-hypertension Group at Internal Medicine Policlinic of Sanglah General Hospital in 2016 (n=123)

Variable	Chronic Kidney Disease				Total		P Value	OR
	Yes		No					(95%CI)
Hypertension	N	%	N	%	N	%		
-Yes	28	43.8	36	56.2	64	100		
-No	10	16.9	49	83.1	59	100		
Total	38	30.9	85	69.1	123	100	0.001	3.811 (1.644-8.832)

Table 9. Distribution of Sample based on Hypertensive Heart Disease in Hipertension Group and Non-hypertension Group at Internal Medicine Policlinic of Sanglah General Hospital in 2016 (n=123)

Variable	Hypertensive Heart Disease				Total		P Value	OR
	Yes		No					(95%CI)
Hypertension	N	%	N	%	N	%		
-Yes	17	26.6	47	73.4	64	100		
-No	6	10.2	53	89.8	59	100		
Total	23	18.7	100	81.3	123	100	0.020	3.915 (1.164-8.774)

B. Discussion

As seen in Table 2, the analytical result for correlation of family history and hypertension showed that subjects with hypertension and family history were 41 out of 45 (91.1%). Chi square test resulted in p-value of 0.001 which showed that hypertension was affected by age and the *odds ratio* (OR) was found out to be 0.178. Based on the result of this research, it can be seen that prevalence of hypertension was more common in individual aged 40 or over. This shows agreement with statement from Pinto, as someone gets older, particularly 50 years old or older, systolic blood pressure tends to increase.[9] Black and Hawks also concluded that the rising of blood pressure started from age 20 and this population were vulnerable to suffer from hypertension in age 30-50.[10] Age is said to correlate with hypertension incidence as artery and arteriole undergo changes to be stiffer. Large artery stiffness caused by alteration of arteriosclerotic structure will lead to increasing blood pressure, meanwhile the rise of diastolic blood pressure mostly caused by an increase in periphery vascular resistance. [9]

As seen in Table 3, there were 38 out of 67 male subjects (56.7%) who suffered from hypertension. Female with hypertension was found out to be 26 out of 56 (46.4%). Chi square test was done and p-value of 0.255 was obtained, this

result showed no significant association regarding gender and hypertension. The o*dds ratio* (OR) was 1.512. Reckelhoff stated that the association of gender and blood pressure is influenced by several factors including androgen, estrogen and testosterone hormone. The effect of testosterone cannot be fully comprehended just yet, but in a study that was done in male and female adolescent aged 13-15, male had a systolic blood pressure 4 times higher than that of female when aged 16-18.[11] This research had a similarity with a study by Sugihorto in term of no significant association revealed for gender and hypertension. [12]

Table 4 shows analytical data for smoking and hypertension. The data showed that in subjects with history of smoking, 19 out of 22 (91.1%) suffered from hypertension. P value from chi square test was 0.000 which mean that there was a significant association between smoking and hypertension, *odds ratio* (OR) was 7.881. Data from *Health Survey of England* shows that individual who smoke in advanced age tend to experience higher systolic blood pressure compared to non smoker.[13] Similar finding of significant association between smoking and hypertension was also stated by Setyanda in a research done in Padang which consisted of 92 male respondents.[14]

Table 5 shows analytical data for obesity and hypertension. It revealed that subjects with obesity who suffered from hypertension were 21 out of 26 (80.8%). Chi square analysis found p-value of 0.001 which indicated a significant association between those two with *odds ratio* (OR) of 5.247. Structural changes in renal which consecutively caused by obesity and the deposition of glycoprotein in renal medulla are said to provoke the disruption of renal sodium absorption[15,16]

Table 6 shows analytical data for family history and hypertension. Subjects diagnosed with hypertension with family history of hypertension were 41 out of 45 (91.1%). Chi square test revealed p-value of 0.000. The result indicated a significant association between hypertension and family history, and the *odds ratio* (OR) was 24.511. Similar finding was also found by Tozawa et al., in a cohort study that was done in 9914 sample in Okinawa (*p=0.003*).[17]

Table 7 shows analytical data for hypertension and diabetes mellitus. From a total of 64 samples, 17 (26.6%) were diagnosed with hypertension and also Diabetes Mellitus. P-value for the chi-square test was 0.004; there was a significant association between hypertension and diabetes mellitus with *odds ratio* (OR) of 4.973. Hypertension is a main risk factor for diabetes mellitus.[6] Hypertension itself may causes insulin resistance and eventually leads to blood glucose regulation failure.[18,19]

Table 8 shows analytical data for hypertension and chronic kidney diseases. From the result, there were 28 of out 64 subjects (43.8%) with hypertension who also suffered from chronic kidney disease. This research found a significant association between hypertension and chronic kidney disease, considering the p-value from chi square test which found out to be 0.001 and the *odds ratio* (OR) was 3.811. Hypertension is a secondary risk factor that may play role in renal problem progression and speeds up glomerular disturbance in chronic kidney disease; this relation seems to happen in a reciprocal way.[7] Hypertension was reported in 85% to 95% patient with *stage* 3–5 chronic kidney disease.[20]

Table 9 shows analytical data for hypertension and hypertensive heart disease. We observed that a total of 17 (26.7%) out of 64 subjects with hypertension also had hypertensive heart disease. Significant association between hypertension and hypertensive heart disease was seen, with p-value of 0.020 and *odds ratio* (OR) of 3.915. Prior studies confirmed that hypertension contributed to subsequent development of cardiac disease up to 50-60%. In patient with hypertension, the risk of heart disease double-folded in men and three-fold higher in women. [21]

IV. CONCLUSION

Based on the result of this research, several points can be concluded:

1. Prevalence of hypertension in Internal Medicine Policlinic of Sanglah General Hospital in 2016 was 52%.
2. There is a correlation between age and hypertension.
3. There is no correlation between gender and hypertension.
4. There is a correlation between obesity and hypertension.
5. There is a correlation between family history and hypertension.
6. There is a correlation between smoking and hypertension.
7. There is a correlation between hypertension and diabetes mellitus.
8. There is a correlation between hypertension and chronic kidney disease.
9. There is a correlation between hypertension and hypertensive heart disease.

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