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RESEARCH ARTICLE

The Relationship Between Hypertension and Urinary Microalbumin in People Over 40 Years of Age

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ABSTRACT

Background : *Hypertension is the risk factor for cardiovascular disease and it is related with endothelial dysfunction. The disease is marked by microalbuminuria. Microalbuminuria is related with the damage of endothelial glomerulus and predictor of chronic renal failure. Microalbuminuria increases albuminuria. This will manifest as endothelial damage of the glomerulus. This study is to assess the relation between hypertension and microalbuminuria in people over 40 years of age*

Methods : *in 13 subjects of essential hypertension in Medan, basic data down and their blood pressure and microalbumin checked in Clinical Laboratory of Prodia on Jl. S. Parman No. 17/223 G Medan. This research use cross section study. Shapiro-Wilk test conducted to find out normal distribution data and Pearson correlation test conducted to find out the relation between the variables. The significant score is P<0.05.*

Results : 6 subjects in this research were in category of A2 (moderate): 3-30 mg/mmol creatinine.7 subject in this study were in category A3(Severe): >30 mg/mmol creatinine. There was correlation (r = 0.898, p = 0.000) between systolic hypertension and microalbuminuria and the correlation between diastolic and microalbuminuria was (r = 0.574, p = 0.040).

Conclusion: *Hypertension is related with the increase of microalbuminuria for both systolic hypertension and diastolic Hypertension.*

Key Words: Hypertension, Microalbuminuria, Chronic renal failure.

INTRODUCTION

Non-communicable diseases (NCDs), including degenerative diseases and man-made diseases, are major factors contributing to morbidity and mortality. In the 21st century, the incidence and prevalence of NCDs are projected to increase rapidly, posing a major challenge to future health issues. The World Health Organization (WHO) estimates that by 2020, NCDs will cause 73% of deaths and 60% of morbidity worldwide.

It is estimated that developing countries, including Indonesia, will be the most affected. One NCD that is currently a very serious health problem is hypertension, known as the silent killer (Ministry of Health of the Republic of Indonesia, 2006).

Hypertension without a known cause is defined as essential hypertension. According to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7), the blood pressure classification Adults are divided into Normal, Prehypertension, Stage 1 Hypertension, and Stage 2 Hypertension (Sudoyo et al., 2014).

Hypertension is a manifestation of impaired hemodynamic balance in the cardiovascular system. Its pathophysiology is multifactorial and cannot be explained by a single mechanism. According to Kaplan, hypertension involves many genetic, environmental, and central hemodynamic regulatory factors. Simply put, hypertension is the interaction of cardiac output (CO) and total peripheral resistance (TPR) (Kaplan NM, 2010).

An estimated 77.9 million people suffer from hypertension in the United States, or 1 in 3 of the population, in 2010. The prevalence of hypertension in 2013 is estimated to have increased by 7.2% from the 2010 estimate (Sudoyo et al., 2009).

The prevalence of hypertension in Indonesia, measured in individuals aged 18 years and older, is 25.8 percent. An estimated 15 million Indonesians suffer from hypertension, but only 4% have controlled hypertension. Meanwhile, the prevalence of hypertension in North Sumatra, according to the 2013 Basic Health Research (Riskesdas), was 6.6%, the fourth lowest for hypertension diagnosed by medical personnel (Riskesdas, 2014).

Urine microalbuminuria is a laboratory test to detect impaired kidney function (kidney leakage) by measuring albumin levels in the urine. (Paramitha Lab, 2014).

Microalbuminuria is a predictor of kidney disease in patients with kidney disease and is also a predictor of morbidity and mortality in patients without evidence of kidney disease. In hypertension, microalbuminuria has been correlated with left ventricular hypertrophy. In patients with hypertension and normal blood pressure, microalbuminuria predicts cardiovascular disease morbidity and mortality. (Bhisnu, 2014).

Microalbuminuria, a slight increase in urine albumin, indicates endothelial damage in the glomeruli and systemic blood vessels, where endothelial dysfunction plays a role in the process of atherosclerosis. Apart from being a sign of kidney damage, microalbuminuria is also a predictor of cardiovascular and kidney disease in people with hypertension and diabetes. (Nelson, 2009).

METHOD

This research was an observational analytical study using a cross-sectional study method. The design used was a cross-sectional study. Subjects were examined at the Prodia S. Parman Clinical Laboratory No. 17/233 G, Medan. The study was conducted in June 2017. The subjects were hypertensive subjects who were planned to be studied directly. Inclusion criteria were adults aged 40 years and over with hypertension.

Patients/families were willing to participate in this study and were willing to provide written informed consent, and were currently or not taking hypertension medication.

Exclusion criteria were patients who were seriously ill or unable to participate in this study, were uncooperative, and did not provide informed consent. Because this study included a hypothesis test using a correlation coefficient, the minimum single sample size was determined using the correlation coefficient r proposed in the Journal of the Department of Biochemistry, Lumbini Medical College, Apollo Hospital, Delhi. Keshab Raj Joshi & Ashish Gautam. Title: "Serum Creatinine and Urine Microalbumin Levels in Hypertensive and Non-Hypertensive Patients."

RESULTS

The characteristics of the subjects in this study only include age and gender, totaling 13 people with hypertension. The ages of the subjects in this study were grouped into 3 groups, namely the 40-50 year age group, 51-60 year age group and 61-70 year age group with the following frequency distribution.

Table 1 Subject Characteristics Based on Age

No	Age Group	Jumlah (n)	Persentase (%)
1	40 – 50 year	4	30.8
2	51 - 60 year	5	38.5
3	61 – 70 year	4	30.8
	Total	13	100

Tabel 2 Subject Characteristics Based on gander type

No	Jenis Kelamin	Jumlah (n)	Persentase (%)
1	Man	4	30.8
2	Woman	9	69.2
	Total	13	100

Tabel 3 Urine Microalbumin Levels

No	Mikroalbumin Urin (mg/g)	Jumlah (n)	Persentase (%)
1	A2 (Moderate) : 3-30 mg/mmol	6	46.2
2	A3 (Severe) : >30 mg/mmol	7	53.8
	Total	13	100

Tabel 4 Subject Composition Based on Hypertension Sistolic

No	Hipertensi Sistolik	Jumlah(n)	Persentase(%)
1	Hipertensi Stadium 1 (140-159 mmHg)	8	61.5
2	Hipertensi Stadium 2 (>160 mmHg)	5	38.5
	Total	13	100

No	Hipertensi Diastolik (mmHg)	Jumlah (n)	Persentase (%)
1	Hipertensi Stadium 1 (90-99 mmHg)	12	92.3
2	Hipertensi Stadium 2 (> 100 mmHg)	1	7.7
Total		13	100

Tabel 6 Average Urine Hypertension and Microalbumin Values by Age

No	Umur	Mikroalbumin urin mg/mmol kreatinin	Hipertensi Sistolik mmHg	Hipertensi Diastolik mmHg
1	40-50 year	23±19.71	146.5±9.14	91.5±3
2	51-60 year	39.6±46.78	153±12.03	94.4±3.23
3	61-70 year	93.4±35.99	165±6.21	95±3.46

Table 7 Results of Normality Test of Systolic Hypertension and Urine Microalbumin Data

No	Variabel	Hasil Uji Normalitas Shapiro-Wilk
1	Hipertensi Sistolik	0.142
2	Mikroalbumin Urine	0.054

Table 8: Pearson Correlation Test Results: Systolic Hypertension and Urine Microalbumin

No	Korelasi	Koefisien Korelasi (r)	Signifikansi
1	Diastolic Hypertension and Urine Microalbumin	0.898	.000

Table 9: Pearson Correlation Test Results: The Relationship Diastolic Hypertension with Microalbumin Urine

No	Korelasi	Koefisien Korelasi (r)	Signifikansi
1		0.574	.040

This study aimed to determine the relationship between hypertension and urinary microalbumin in people over 40 years of age. The subjects were 13 hypertensive individuals in Medan, consisting of 4 men and 9 women, who underwent examination at the Prodia laboratory clinic.

The quantitative analysis using Pearson correlation test revealed a significant correlation between urinary microalbumin and hypertension,

with a strength of correlation (r-count) of 0.898. Therefore, the majority of the study subjects, 7 (53.8%), had high urinary microalbumin.

The results of this study, when viewed from the average values, showed that subjects in the 40-50 age group had an average urine microalbumin level of 23 mg/mmol creatinine, while subjects in the 51-60 age group had an average urine microalbumin level of 39.6 mg/mmol creatinine, and subjects in the 61-70 age group had an average urine microalbumin level of 93.4 mg/mmol creatinine. Therefore, subjects in the 61-70 age group had the highest average urine microalbumin level, at 93.4 mg/mmol creatinine.

Based on the average values, subjects in the 40-50 age group had an average hypertension of 146.5 mmHg, while subjects in the 51-60 age group had an average hypertension of 153.4 mmHg, and subjects in the 61-70 age group had an average hypertension of 165 mmHg. Therefore, subjects in the 61-70 age group had the highest average hypertension score, at 165 mmHg.

The results of this study also align with previous research, which found a strong correlation between hypertension and urinary microalbumin levels in hypertensive and non-hypertensive patients (Keshab Raj Joshi et al., 2013), with an estimated r value of 0.707.

The results of this study also align with those of Eric Nelson, entitled "The Relationship Between Microalbuminuria Assessed by the Urinary Albumin-Creatinine Ratio and Left Ventricular Hypertrophy in Patients with Essential Hypertension" (Nelson E, 2009). This study demonstrated that higher urinary albumin levels increase the risk of hypertension, and vice versa. In other words, high levels of urinary albumin influence blood pressure.

Clinical evidence suggests that albuminuria or microalbuminuria (ACR = Albumin-Creatinine Ratio) >30 mg/g or >3 mg/mmol can be used as a marker or predictor of endothelial organ damage and is usually a marker of chronic kidney failure (Ki-Sung Chul, 2016).

CONCLUSION

Based on the research and discussion conducted on the relationship between hypertension and urinary microalbumin in adults over 40 years of age in Medan, it can be concluded that there is a significant and very strong correlation between systolic hypertension and urinary microalbumin. There is also a significant and moderate correlation between diastolic hypertension and urinary microalbumin in adults.

The majority were men (30.8%), 8 (61.5%) had Stage 1 hypertension and 5 (38.5%) had Stage 2 hypertension. 6 (46.2%) had a urine microalbumin level of category A2 (Moderate), and 7 (53.8%) had a urine microalbumin level of category A3 (Severe): >30 mg/mmol creatinine.

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