RELATIONSHIP BETWEEN HYPERTENSION AND DIABETES MELLITUS TYPE 2 WITH BENIGN PROSTATE HYPERPLASIA IN MGR. GABRIEL MANEK HOSPITAL ATAMBUA

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ABSTRACT

Objectives: *To evaluate the relationship between hypertension (HT) and diabetes mellitus type 2 (DM type 2) with benign prostate hyperplasia (BPH).*Material & methods:*This is a case control study with group A (case) consist of 78 BPH patient and group B (control) consist of 78 non BPH patient. DM and HT status from each group was collected. Correlation between each variables and odds ratio was analyzed.*Results: *Mean age was 66.09 ± 9.05 and 63.40 ± 9.83 years in group A and group B respectively. There is a statistical significant correlation between HT (0.001) and DM (0.021) with BPH (p<0.05). Patient with hypertension are 7.8 times more likely to suffer from BPH (OR 7.882) and patient with DM are 3 times more likely to suffer from BPH.*Conclusion: *HT and DM type 2 are significantly related to BPH incidence in Mgr. Gabriel Manek Hospital. Patient with HT and DM type 2 are more likely to suffer from BPH. Prevention and management of HT and DM type 2 may help to reduce the incidence of BPH.*

Keywords : benign prostate hyperplasia, diabetes mellitus type 2, hypertension

Benign prostate hyperplasia (BPH) is a focal enlargement of the peri-urethral region of the prostate seen in most aging men, which results in symptoms requiring clinical intervention in approximately one-third of men over the age of 60 years.[1] Currently, BPH is the fourth most prevalent disease in men aged >50 years.[2] In 2013, Indonesia has 9.2 million cases of BPH, most of them were suffered by men aged over 60 years.[3] It usually begins as a simple micronodular hyperplasia with a subsequent macroscopic nodular enlargement that may result in bladder outlet obstruction and the development of lower urinary tract symptoms (LUTS).[4]

Hypertension is a global problem characterized by high morbidity.[5] In the UK, the National Institute for Health and Care Excellence (NICE) defines high blood pressure (BP), also known as hypertension, as a clinic blood pressure of 140/90 mmHg or higher confirmed by a subsequent ambulatory blood pressure monitoring daytime average of 135/85 mmHg or higher.[6] The prevalence of hypertension based on Riskesdas 2018 in Indonesia is 34,11% .[7] The risk factors of hypertension include sedentary lifestyle, stress, visceral obesity, potassium deficiency, obesity, salt sensitivity, alcohol intake, and vitamin D deficiency.[8]

And diabetes mellitus (DM) affects 7,8% of US population. In 1996, Bourke and Griffin first reported the higher prevalence of DM among men subjected to prostatectomy than in general male population. Insulin is involved in the pathogenesis of BPH through its action on sympathetic nerve activity and by insulin itself as a mitogen and a growth factor for prostate epithelial cells.[9]

Although the etiology of BPH is still largely unresolved and poorly understood, DM is known to be associated with and increased of hypertension and greater severity of BPH.[10] Single components of metabolic syndrome (obesity, dyslipidemia, hypertension, and insulin resistance) as well as the syndrome itself may predispose patients to a higher risk of BPH and lower urinary tract symptoms.[2]

OBJECTIVE

The aim of this study is to evaluate the relationship between hypertension and DM type 2 with BPH patients in Mgr. Gabriel Manek Hospital Atambua.

MATERIAL & METHOD

This is a case control study with group A (case) consist of 78 BPH patient and group B (control) consist of 78 non BPH patient. DM and HT status from each group was collected. Correlation between each variables and odds ratio was analyzed.

The diagnosis of DM in this study was defined as blood glucose level > 200mg/dl; hypertension was definedby SBP ≥140 mmHg or DBP of ≥90 mmHg according to JNC VII.

Two type of statistics were performed, univariate analytic to show distribution of each risk factors and bivariate analytic statistics using chi square and odd ratio (OR) to evaluate the relationship between BPH and risk factors.

RESULTS

Mean age was 66.09 ± 9.05 and 63.40 ± 9.83 years in group A and group B respectively. Based on Table 1, it can be seen that the patient group is divided into groups of BPH and non-BPH patients, then differentiated into patients who have a history of hypertension – DM type 2 and do not have a history of hypertension – DM type 2. BPH patients are divided into several age ranges, 40-49 years (2.56%), 50-59 years (23.08%), 60-69 years (32.05%), 70-79 years (35.90 %), and 80-89 years (0.64%).

Table 1. Sample Characteristic

Risk Factor		Case Group N= 78	Control Group N= 78
Age (Mean ± SD) (years)		66.09 ± 9.05	63.40 ± 9.83
Age Group (years) (N (%))			
	40-49	2 (2,56%)	5 (6,41%)
	50-59	18 (23,08%)	20 (25,64%)
	60-69	25 (32,05%)	28 (35,90%)
	70-79	28 (35,90%)	22 (28,20 %)
	80-89	5 (0,64%)	3 (3,85%)
Hypertension (N(%))			
	No Hypertension	34 (43,59%)	67 (85,89%)
	Hypertension	44 (56,41%)	11 (14,10%)
Hypertension Categories (N(%))			
	Normal	34 (43.59%)	67(85,89%)
	Hypertension Grade 1	30 (38,46%)	6 (7,69%)
	Hypertension Grade 2	10 (12,82%)	3 (3,85%)
	Hypertension Grade 3	4 (5,13%)	2 (2,56%)
Diabetes Mellitus Type 2 (N(%))			
	No Diabetes	62 (79,49%)	72 (92,31%)
	Diabetes Mellitus Type 2	16 (20,51%)	6 (7,69%)

There was an increase in the number of BPH incidences in line with the increasing range of age groups, except in the 80-89-year age group. The total number of hypertensive patients in the case group was 56.41% and 14.10% in the control group. The distribution of the degree of hypertension in the case group was grade 1 (38.46%), grade 2 (12.82%), and grade 3 (5.13%). And for the prevalence of type 2 diabetes mellitus patients, there were 16 patients (20.51%) in BPH patients and 6 patients (7.69%) in non BPH patients.

Analysis of the relationship between the independent variable (history of hypertension and DM type 2) and the dependent variable (BPH) in this study used the chi square test.

Table 2. Relationship between BPH with Hypertension and DM Type 2

	Value		df	Asymp. Sig. (2-sided)		Exact Sig. (2-sided)		Exact Sig. (1-sided)	
	HT	DM		HT	DM	HT	DM	HT	DM
Pearson Chi-Square	30.582[a]	5.292[a]	1	.000	.021				
Continuity Correction[b]	28.757		1	.000	.038				
Likelihood Ratio	32.185	4.286	1	.000	.019				
Fisher's Exact Test						.000	.037	.000	.018
Linear-by-Linear Association	30.386	5.258	1	.000	.022				
McNemarTest[b]						.001[c]	.000[c]		
N of Valid Cases	156								

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 27.50.

b. Computed only for a 2x2 table

c. Binomial distribution used.

In table 2, the chi square value in the statistical table with a significance of 0.05 and df = 1 is 3,841. The Chi square count for HT and DM are more than the Chi square table, namely 30.582 (> 3,841) and 5.292 (> 3.841). The significance is 0.000 (<0.05) for HT and 0.021 (<0.05) for DM.

Table 3. Risk Estimation for Hypertension

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Hypertension (No / Yes)	7.882	3.617	17.178
For cohort BPH = Patient Non BPH	3.317	1.920	5.729
For cohort BPH = Patient BPH	.421	.310	.570
N of Valid Cases	156		

In table 3, it can be seen that the Odds Ratio (OR) value is 7,882.

Table 4. Risk Estimation for DM Type 2

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Diabetes (No / Yes)	3.097	1.142	8.400
For cohort BPH = Patient Non BPH	1.970	.978	3.968
For cohort BPH = Patient BPH	.636	.465	.871
N of Valid Cases	156		

In table 4, we can see that the Odds Ratio (OR) value of 3.097 means that people who have diabetes are more likely to experience BPH incidence 3.097 times than people who do not have diabetes.

DISCUSSION

BPH is a progressive condition characterized by prostate enlargement leading to lower urinary tract symptoms (LUTS).[1] BPH is seen frequently in males older than 50 yr. and in 50% males aged 60-70 yr. with LUTS; 25% of the latter need surgical treatment.[12] Our results demonstrated that BPH is more frequent in older aged group.We have 35,90% patients with BPH in group age 70-79 years old.

Several risk factors are involved the occurrence of BPH disease such as age, historyfamily, obesity, sexual activity, lack exercise, smoking habits, drinking habits alcoholic beverages.[13]

In this study, there is a statistical significant correlation between hypertension (0.00) and DM type 2 (0.021) with BPH ($p<0.05$).

The prevalence of BPH and arterial hypertension increase with age, and hence both are frequent disease states in the elderly male.[12] Hypertension was also associated with BPH/LUTS in several animal models and epidemiologic. Golomb et al reported that spontaneously hypertensive rats develop BPH-like features with aging in the absence of any inductive exogenous agents. Conversely, their normotensive counterparts did not develop such features.[2] The diagnosis of hypertension is made on the basis of blood pressure measurements, but a reliable diagnosis requires multiple readings at different times under well-defined condition.[12] Since our data in this study had not been primarily generated with purpose of studying hypertension, we have used only data by the diagnosis of hypertension from patient's medical records.

A previous study has detected a higher prevalence of hypertension in men undergoing BPH related surgery than in a series of control patients.An increased sympathetic tone and/or increased α1-adrenoceptor function have long implicated in the pathophysiology of essential hypertension. While BPH was originally thought to result primarily from obstruction of bladder outflow due to increased organ size, later concepts have emphasized that increased prostatic smooth muscle tone may also contribute to obstruction as dynamic component since the latter is primarily controlled by neuronally released noradrenaline acting on smooth muscle α1-adrenoceptors.[12]

Recent studies suggest that hyperinsulinemia secondary insulin resistance and the components of metabolic syndrome are risk factors for BPH.In the study conducted by Dahle et al, increased serum insulin level was related to increased BPH risk.[11] The major endocrine aberration in connection with metabolic syndrome is hyperinsulinemia. Insulin is an independent risk factor and a promoter of BPH. Insulin resistance may change the risk of BPH through several biological pathways. Hyperinsulinemia stimulates the liver to produce more insulin-like growth factor

(IGF), another mitogen and an anti-apoptotic agent which binds insulin receptor/IGF receptor and stimulates prostate growth.[9]Similar to other study, our results demonstrated the patients with diabetes had a significantly higher risk to have BPH.

The odds ratio for HT and DM type 2 are 7.882 and 3.097 respectively. This indicates that patient with HT are 7.8 times more likely to suffer from BPH compare to normotension patient whereas patient with DM type 2 are 3.097 times more likely to suffer from BPH compare to patient without DM type 2.

CONCLUSION

BPH is common and a major health problem especially in elderly male groups. The correlations between hypertension and DM type 2 with BPH have been observed in many studies. We established in our study that hypertension and DM type-2 were significantly related to BPH incidence in Mgr. Gabriel Manek Hospital. Patient who have diabetes and hypertension are more likely to experience BPH in their life.

REFERENCES

1. Afroz, T., Sultana, N., Rahman, M., Begum, A., Muna, F., & Rahman, M. (2017). Association Between Metabolic Syndrome and Benign Prostate Hyperplasia. Bangladesh Journal of Medical Biochemistry, *8*(2), 42–48.

2. Abdollah, F., Briganti, A., Suardi, N., Castiglione, F., Gallina, A., Capitanio, U., &Montorsi, F. (2011). Metabolic syndrome and benign prostatic hyperplasia: Evidence of a potential relationship, hypothesized etiology, and prevention. Korean Journal of Urology, *52*(8), 507–516.

3. Kocjancic, E., &Iacovelli, V. (2018). Benign prostatic hyperplasia (BPH). In Encyclopedia of Reproduction (pp. 467–473). Elsevier.

4. Rył, A., Rotter, I., Miazgowski, T., Słojewski, M., Dołęgowska, B., Lubkowska, A., &Laszczyńska, M. (2015). Metabolic syndrome and benign prostatic hyperplasia: Association or coincidence? Diabetology and Metabolic Syndrome, *7*(1).

5. Zeng, X. T., Weng, H., Jin, Y. H., Liu, T. Z., Liu, M. Y., & Wang, X. H. (2018, May 1). Association between Diabetes Mellitus and Hypertension in Benign Prostatic Hyperplasia Patients. Chinese Medical Journal.

6. Kitt, J., Fox, R., Tucker, K. L., & McManus, R. J. (2019, June 1). New Approaches in Hypertension Management: a Review of Current and Developing Technologies and Their Potential Impact on Hypertension Care. Current Hypertension Reports.

7. Riset Kesehatan Dasar(Riskesdas) (2018). Badan Penelitian dan Pengembangan Kesehatan Kementerian RItahun 2018.http://www.depkes.go.id/resources/download/infoterkini/materi_rakorpop_2018/Hasil%20Riskesdas%202018.pdf

8. Ni, X., Meng, H., Zhou, F., Yu, H., Xiang, J., & Shen, S. (2016). Effect of hypertension on bacteria composition of prostate biopsy in patients with benign prostatic hyperplasia and prostate cancer in PSA grey-zone. Biomedical Reports, 4(6), 765–769.

9. Wang, Z., &Olumi, A. F. (2011). Diabetes, growth hormone-insulin-like growth factor pathways and association to benign prostatic hyperplasia. Differentiation.

10. Kopp, W. (2018). Diet-Induced Hyperinsulinemia as a Key Factor in the Etiology of Both Benign Prostatic Hyperplasia and Essential Hypertension.Nutrition and Metabolic Insights, 11, 117863881877307.

11. Ozden, C., Ozdal, O. L., Urgancioglu, G., Koyuncu, H., Gokkaya, S., &Memis, A. (2007). The Correlation between Metabolic Syndrome and Prostatic Growth in Patients with Benign Prostatic Hyperplasia. European Urology, 51(1), 199–206.

12. Michel, M. C., Heemann, U., Schumacher, H., Mehlburger, L., &Goepel, M. (2004). Association of hypertension with symptoms of benign prostatic hyperplasia. Journal of Urology, 172(4 I), 1390–1393.

13. Devi, K., Frasiska, A., Agung, A., & Oka, G. (2018). Usia dan obesitasberhubunganterhadapterjadin yapenyakit benign prostatic hyperplasia di RSUP Sanglah Bali periodejanuari 2014 sampaidesember 2014. E-JurnalMedika, *7*(1), 2–4.