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The association of prostatic inflammation grade with prostate volume and Prostate-Specific Antigen (PSA) value in Benign Prostate Hyperplasia (BPH) patients at Wahidin Sudirohusodo Hospital, Makassar

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ABSTRACT

Background: Prostate inflammation is commonly found in patients with benign prostate hyperplasia. On the histopathological examination, infiltration of the prostate gland's inflammatory cells was visible in chronic inflammation of the prostate. This study aims to determine prostate inflammation's association based on the histological examination with prostate volume and prostate-specific antigen (PSA) levels in benign prostate hyperplasia (BPH) patients.

Methods: A cross-sectional study was enrolled among 50 subjects with benign prostate enlargement observed at Wahidin Sudirohusodo hospital and its affiliate Hospitals in Indonesia from April to September 2018. The patients' data, including age, prostate volume, PSA level, and histopathology, were collected. Statistical tests using Chi-square were performed (considered significant if $P < 0.05$). Data were analyzed using SPSS version 17 for Windows.

Results: Among 50 subjects, the age ranged from 51 to 85 years, with an average of 68.2 ± 8.9 years, while the prostate volume average remained at 64.2 ± 31.4 mm^3. The average of the prostate-specific antigen (PSA) grade was 21.0 ± 30.2 ng/ml. The statistical analysis showed the association of age with the degree of inflammation ($P = 0.25$), the relationship of the prostate volume of the degree of inflammation ($P = 0.46$) and the value of PSA ($P = 0.74$). Among the 50 subjects examined, 100% were inflamed. The highest grade of inflammation was a moderate degree by 19 cases (38%). There is no significant relationship between the degree of inflammation with prostate volume and PSA's value ($p>0.05$). Besides, there is no significant association between the degree of prostate inflammation with prostate volume and the value PSA levels ($p>0.05$).

Conclusion: On the histopathological examination, inflammation was found in all research subjects with BPH, in which the highest degree of inflammation was at a moderate level.

Keywords: Inflammation, Grade of Inflammation, Benign Prostatic Hyperplasia (BPH), Prostate-Specific Antigen (PSA)
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INTRODUCTION

Benign prostate hyperplasia (BPH) is diagnosed using the histopathological examination.[1] This disease's incidence rises along with the increase of age, with approximately 50-75% in the age of 50, 80% in >70 years, and 90% in the age group of 85 years and older.[1] Generally, the incidence of this disease ranges from 8.5-4l/1000 cases per year.[1] Prostate-specific antigen (PSA) is an important biological marker and is often used to screen and estimate disease recurrence of prostate enlargement.[2]

The cause of chronic prostate inflammation (Prostatitis) is still unclear and may occur because several stimuli play a role simultaneously.[3] Several different sources are thought to cause prostate inflammation, including bacterial infections (*Escherichia coli*), viruses (human papillomavirus, human herpes simplex virus, and cytomegalovirus), sexually transmitted organisms (*Neisseria gonorrhea*, *Treponema pallidum*, *Chlamydia*, and *Vaginal trichomonas*, dietary factors, hormones, autoimmune responses, and urine reflux.[3] Although the prevalence of prostate inflammation or Prostatitis remains high, the exact cause is still unclear.[3]

Prostate inflammation is commonly found in BPH patients. On the histopathological inspection, infiltration of the prostate gland's inflammatory cells was visible in chronic inflammation of the prostate.[4] It indicates that prostate inflammation makes a significant contribution to the etiology of benign prostatic hyperplasia. Bacterial colonization and prostate infection play a

role in initiating and maintaining chronic inflammation. Asymptomatic bacterial infections are relatively numerous but have not been diagnosed.[4] Enlargement of the prostate will be proportional to the increase in prostate volume. Prostate volume can be measured by performing an abdominal or transracial ultrasound.[5] One of the parameters in detecting prostate enlargement is the examination of PSA levels in the blood.[6]

According to the aforementioned above, this study aims to determine the association of prostate inflammation with prostate volume and the value PSA levels in BPH patients.

METHODS

Analytical research using a cross sectional study design was employed. The study was conducted at Wahidin Sudirohusodo Hospital, Universitas Hasanuddin Hospital, Ibnu Sina Hospital, and Awal Bros Hospital in Makassar from April to September 2018. There were 50 BPH subjects who met the inclusion criteria. The inclusion criteria were those with prostate hyperplasia, undergoing TURP or open prostatectomy procedures and willing to participate as research subjects, while the exclusion criteria were those whose tumor tissue samples were inadequate for histopathological examination, undergoing previous hormonal therapy, whose family refused to participate in this study, and with prostate carcinoma. Before the TURP procedure was performed, the subjects' blood samples were collected for PSA level and abdominal ultrasonography examinations. During the TURP, random prostate tissue specimens, about 1-2 grams, were obtained using a sterile method with a resectoscope and stored in a tube before transferred to the laboratory. Besides, some tissue specimens were examined with a histopathological inspection.

The data were collected in a group by the purpose and types before the appropriate statistical method was determined. The sensitivity, specificity, and statistical tests were determined using Pearson's coefficient of linear correlation (rxy/r) and linear regression. All of data were analyzed using SPSS version 17 for Windows.

Table 1. The characteristics of research subjects

Variable	N	Value
Age (mm^3) (mean±SD)	50	68.2 ± 8.9
Prostate Volume (mm^3) (mean±SD)	46	64.2 ± 31.4
PSA serum (Average ± SD) [ng/mL]	42	21.0 ± 30.2
Histopathology Diagnose, n (%)		
Benign prostatic hyperplasia	0	0
Benign prostatic hyperplasia + Prostatitis	50	100
Inflammation Level, n (%)		
Mild	17	34
Moderate	19	38
Severe	14	28

SD: standard deviation; BPH: benign prostatic hyperplasia; PSA: Prostate-specific Antigen

Table 2. The relationship between the age groups in patients with BPH and the grade of inflammation

Variable	Inflammation Level (N=50)			P
	Mild	Moderate	Severe	
Age (Year), n (%)	3 (37.5)	2 (25.0)	3 (37.5)	0.25
< 60	4 (20.0)	8 (40.0)	8 (40.0)	
60-69	10 (45.5)	9 (40.9)	3 (13.6)	
Prostate Volume, n (%)				
< 20 gram	1 (100.0)	0 (0.0)	0 (0.0)	0.46
20-40 gram	4 (33.3)	3 (25.0)	5 (41.7)	
≥ 40 gram	11 (33.3)	14 (42.4)	8 (24.2)	
PSA serum, n (%)				
< 4 ng/mL	4 (44.4)	4 (44.4)	1 (11.1)	0.74
4-10 ng/mL	5 (38.5)	5 (38.5)	3 (23.1)	
≥ 10 ng/mL	7 (35.0)	6 (30.0)	7 (35.0)	
≥70				

Chi-Squared test; Data were considered statistically significant if the p-value less than 0.05.

RESULTS

A total of 50 subjects were examined with histopathological inspection and reviewed by one pathologist. The result showed that 50 patients (100%) had BPH and Prostatitis with different inflammation grades (Table 1). Table I shows that the highest percentage of inflammatory grading among all subjects was the moderate Level with 19 subjects (38%). The average age in this study was 68.2 ± 8.9 years. Meanwhile, the average prostate volume remained at 64.2 ± 31.4 mm^3 and the average serum PSA level was at 21.0 ± 30.2 ng/mL. Characteristically, the largest age group was at > 70 years (44.0%). 33 subjects (71.7%) had the prostate volume with >40 grams, and 20 subjects (47.6%) had PSA levels >10 ng/mL (Table 1).

Table 2 shows no significant relationship between the age in BPH patients with the grade of inflammation (p> 0.05). However, the severe degree of inflammation was found the most among the subjects aged 60-69 years (40,0%), while the degree of mild inflammation was found the most among older subjects at >70 years (45.5%) (Table 2).

Table 2 also shows no significant relationship between prostate volume to the degree of inflammation in the study subjects (p> 0.05). The moderate degree of inflammation made up the

highest percentage (42.4%) by 14 subjects with a volume prostate of >40 gram. In comparison, the degree of severe inflammation remained the lowest at 8 subjects (24.2%) with a volume of >40 grams (Table 2).

There was no significant relationship between increasing levels from serum and the degree of inflammation in the study subjects (p> 0.05) (Table 2). It can be seen that the highest percentage of the degree of inflammation was found in the subjects with the PSA of >10 ng/mL, and the lowest was at the PSA of <4 ng/mL.

DISCUSSION

Most of the patients in this study were found to have the largest prostate volume among 68,2 ± 8,9 years old respondents. This result is in line with a study by Zor M et al., which shows that the largest group has a 40-60cc prostate volume within the age group of 60-70 years.[7] The study by Deori R et al reveals that the largest age group ranged from 60 to 69 years with the average prostate of 42.5 ± 19.6.[8]

Our recent findings show no significant relationship between the age in BPH patients with the grade of inflammation. This result is in line with the study by Zlotta AR et al who conducted a retrospective observational study on the role of inflammation in the progression of BPH in various age groups.[9] The study shows no association between the increased age and the degree of inflammation in patients with BPH (P = 0.11).[9]

The recent findings suggest no significant relationship between prostate volume to the degree of inflammation in the study subjects (p> 0.05). The moderate degree of inflammation made up the highest percentage in this study. The result is on the contrary with the study by Descazeaud et al. which shows that the international prostate symptom score data and prostate volume are greater in patients with severe degrees of prostate inflammation.[10]

There was no significant relationship between increased serum levels and the degree of inflammation in the study subjects. Also, the highest percentage of the degree of inflammation was found in the subjects with a PSA of >10 ng/mL. The study of Cakir shows no significant differences in the PSA levels between patients with and without prostate inflammation.[11] However, the study by Meert T et al. reveals a significant but very weak correlation between serum PSA levels and chronic inflammation in patients with BPH.[12] Nonetheless, these findings indicate that inflammation occurs among all patients with BPH and prostatitis.[13]

CONCLUSION

Based on research conducted on 50 BPH patients who underwent TURP or open prostatectomy procedures, there is no significant association of the degree of inflammation with prostate volume and PSA levels in BPH and prostatitis patients.

CONFLICT OF INTEREST

None.

ETHICS CONSIDERATION

This study has been approved by the Ethics Committee, Faculty of Medicine, Universitas Hasanuddin, Makassar, Indonesia, prior to the study being conducted.

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AUTHORS CONTRIBUTION

All of the authors equally contribute to the study from the conceptual framework, data gathering, and data analysis until reporting the study results through publication.

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