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# Prostate volume, LUTS scale, and uroflowmetry of benign prostate hyperplasia patients with type 2 diabetes mellitus

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## Abstract

**Introduction.** Benign prostate hyperplasia (BPH) is an enlargement of the prostate due to abnormal proliferation or apoptosis failure of the epithelial or stroma tissues.

**Objective.** To compare the prostate volume, IPSS score (LUTS scale), and uroflowmetry of BPH patients with type 2 diabetes mellitus.

**Materials & Methods.** The medical records of BPH patients from 2011 to 2015 were assessed with an analytical retrospective study based on the prostate volume, IPSS score (LUTS scale), and Q max using uroflowmetry. The data were analyzed using the chi-square test by online statistical analysis.

**Results.** Among 62 patients recorded, 11 patients were diabetic, while the rest were non-diabetic. No notable differences were observed between the two groups ($p > 0.05$) in prostate volume, IPSS score, and Q max.

Conclusion. No significant differences in prostate volume, IPSS score (LUTS scale), and uroflowmetry between diabetic and non-diabetic BPH patients.

**Keywords:** BPH; IPSS; prostate volume; type 2 diabetes mellitus; uroflowmetry

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# Объём предстательной железы, симптомы нижних мочевых путей и урофлоуметрические показатели у пациентов с доброкачественной гиперплазией простаты и сахарным диабетом 2 типа

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## Аннотация

**Введение.** Доброкачественная гиперплазия простаты (ДГП) — это увеличение простаты вследствие аномальной пролиферации или нарушения апоптоза эпителиальной или стромальной ткани.

**Цель исследования.** Сравнить объём простаты, выраженность симптомов нижних мочевых путей (СНМП) по шкале IPSS и урофлоуметрические показатели у пациентов с ДГП и сахарным диабетом 2 типа (СД 2Т).

**Материалы и методы.** Проведена аналитическая ретроспективная оценка медицинских карт пациентов с ДГП за период с 2011 по 2015 годы. Оценены данные объёма простаты, баллы шкалы IPSS и Q max посредством

урофлоуметрии. Данные анализировались с помощью теста хи-квадрат.

**Результаты.** Из 62 пациентов 11 страдали СД 2Т, остальные нет. Между двумя группами не было отмечено существенных различий (p > 0,05) в объёме простаты, баллах IPSS и Q max.

**Заключение.** Значимых различий в объёме простаты, тяжести симптомов нижних мочевых путей и урофлоуметрических показателях между пациентами с и без СД 2Т не выявлено.

**Ключевые слова:** доброкачественная гиперплазия простаты; IPSS; объём простаты; сахарный диабет 2 типа; урофлоуметрия

**Финансирование.** Исследование проводилось при финансировании / поддержке отдела медицинской документации больницы Dr. Soetomo и сотрудников медицинского факультета Университета Airlangga. **Благодарности.** Выражаем благодарность отделу медицинской документации больницы Dr. Soetomo и сотрудникам медицинского факультета Университета Airlangga за поддержку данного исследования. **Конфликт интересов.** Авторы не заявляют о конфликте интересов. **Этическое заявление.** Это аналитическое ретроспективное обсервационное исследование, в ходе которого были получены медицинские карты пациентов с ДГП, поэтому сертификат об этическом одобрении отсутствует. **Информированное согласие.** Все пациенты подписали информированное согласие на участие в исследовании и обработку персональных данных.

**Вклад авторов:** Ариф Нур Хаким — концепция исследования, разработка дизайна исследования, анализ данных, подготовка рукописи, критический обзор, научное редактирование; Соэтоджо Соэтоджо — обзор литературы, подготовка рукописи, критический обзор, научное редактирование; Пуджи Лестари — сбор данных, анализ данных, статистическая обработка данных, критический обзор, научное редактирование.

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## Introduction

Benign prostate hyperplasia (BPH) is an enlargement of the prostate due to abnormal proliferation or apoptosis failure of the epithelial or stroma tissues. In Indonesia, approximately 2.5 million men aged 60 and above suffer from lower urinary tract symptoms (LUTS) and put BPH as the second-highest prevalence in Indonesia urology clinics after urolithiasis [1, 2]. Its symptoms include urinary incontinence, polyuria, and a weak urine stream [3].

LUTS, associated with BPH, commonly develops in type 2 diabetes mellitus (T2DM) patients [4]. According to the World Health Organization, Indonesia ranks the seventh largest worldwide with an estimated 10 million patients and is predicted to grow to 21.257 million patients in 2030[1]. T2DM is a chronic metabolic disease caused by the failure of the body to maintain normal glucose levels because of higher-than-normal insulin resistance (hyperinsulinemia) [5]. In hyperinsulinemia, the IGF-1 level in serum increases, which may bind with the IGF-1 receptor on the prostate, resulting in prostate cell proliferation being more active [6]. This causes microvascular and macrovascular complications and manifests as multiple systemic disorders [7].

Presently, available data on the correlation between BPH and T2DM is very limited. Therefore, this research aims shed light on this matter by comparing the prostate volume, International Prostate Symptom Score (IPSS) or LUTS scale, and uroflowmetry of benign prostate hyperplasia patients with type 2 diabetes mellitus.

This study aimed to compare the prostate volume, IPSS score (LUTS scale), and uroflowmetry of benign prostate hyperplasia (BPH) patients with type 2 diabetes mellitus.

## Materials and methods

Research design. An analytical retrospective observational study using the medical records between 2011 and 2015.

Ethical clearance. This is an analytical retrospective observational study that obtains the medical records of BPH patients; thus, the ethical clearance certificate is not available.

Data collection and analysis. The clinical parameters used for comparison were prostate volume, IPSS or LUTS scale, and urine flow rate using uroflowmetry. The maximum urine flow rate (Q max) was calculated electronically as milliliters of urine passing per second.

The data was collected with consecutive sampling by excluding medical records that do not contain all three clinical parameters. Statistical analysis was performed using the Chi-square test + Yates correction from the website socialstatisic.com (https://www.socscistatistics.com/tests/chisquare2/Default2.aspx).

Patient consent. All patients have already given their consent for this study.

1– World Health Organization. Diabetes: Facts and Numbers. 2016.

## Results

Prostate volume. All included participants in this study have an average age of 63 years old (63.1 years for T2DM patients and 63.7 years for non-T2DM patients). The prostate volume of < 20 ml was more common in the diabetic BPH group (8 patients — 72.7%), while 66% (34 patients) of the non-diabetic group recorded to have a volume of > 30% (Table). The Chi-square test showed no significant difference in the prostate volume between these groups (p > 0.05).

**Table.** Research data distribution between diabetic and non-diabetic BPH patients

| Characteristic | Diabetic | Non-diabetic | P |
|---|---|---|---|
| Total Patient | 11 | 51 | |
| Age* | 63.1 | 63.7 | |
| Prostate volume | | | |
| < 20 ml | 1 (9.1%) | 2 (3.9%) | |
| 20 – 30 ml | 2 (18.2%) | 15 (29.4%) | 0.617 |
| > 30 ml | 8 (72.7%) | 34 (66.7%) | |
| IPSS | | | |
| 0 – 7 | 1 (9.1%) | 10 (20%) | |
| 8 – 19 | 6 (54.5%) | 21 (41%) | 0.620 |
| 20 – 35 | 4 (36.4%) | 20 (39%) | |
| Q max | | | |
| < 10 ml/s | 5 (46%) | 29 (57%) | |
| 10 – 14 ml/s | 3 (27%) | 9 (18%) | 0.719 |
| > 15 ml/s | 3 (27%) | 13 (25%) | |

Notes. 1) p — calculated using the chi-square ($X^2$) method + Yates correction; 2) * — mean

International prostate symptom score (IPSS). Based on the International Prostate Symptom Score (IPSS), each group had the same percentage for the moderate and severe categories, with 54.54% in the diabetic BPH group and 41.17% in the non-diabetic one. However, those results yield an insignificant difference (p > 0.05) (Table).

Q max value. Uroflowmetry test was conducted to evaluate the flow of urine on BPH patients. In this study, from the 11 BPH patients with T2DM, 3 patients have Q max of < 10 ml/s, 3 patients have Q max of 10 – 14 ml/s, and 3 patients have Q max > 15 ml/s. Moreover, of the 51 BPH patients without T2DM, 29 patients have Q max < 10 ml/s, 9 patients have Q max of 10 – 14 ml/s, and the remaining 13 patients have Q max x > 15 ml/s. Nevertheless, there was no significant difference in the Q max score between BPH patients with and without T2DM (p > 0.05) (Table).

## Discussion

BPH may lead to urinary retention and may be worsened by T2DM. In this study, diabetic and non-diabetic BPH patients were compared using three clinical parameters, namely prostate volume, IPSS, and Q max. This study found insignificant differences in prostate volume in both groups, indicating that T2DM does not increase prostate volume. Furthermore, these findings contradict previous research that revealed diabetic BPH patients have higher prostate volume than non-diabetic BPH patients (p < 0.05) [8, 9].

The inconsequential IPSS values between groups in this research were consistent with A. Otunctemur et al. (2015) which found that T2DM does not exacerbate LUTS symptoms in BPH patients [8]. Moreover, the Q max, an indicator to diagnose an enlarged prostate, showed no significant differences in both groups. It indicates that T2DM does not affect Q max in BPH patients [8, 10].

This study observed that T2DM has no notable effect on the prostate volume, IPSS, and Q max in BPH patients. However, the correlation between T2DM and BPH remains unclear. Moreover, other variables were not included, such as BMI, estrogen level, and serum glucose may also influence the results of this study [11].

## Conclusion

No significant differences in prostate volume, IPSS (LUTS scale), and uroflowmetry were observed between BPH patients with and without T2DM. Further research is needed to analyze the correlation between diabetes with BPH and LUTS.

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