

# OUTCOMES ANALYSIS OF TRANSURETHRAL RESECTION OF THE PROSTATE (TURP) AND TRANSURETHRAL VAPORIZATION OF THE PROSTATE (TUVP) IN PATIENT WITH BENIGN PROSTATE HYPERPLASIA: SYSTEMATIC REVIEW

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## ABSTRACT

**Objective:** This systematic review aims to compare IPSS score and Uroflowmetry ( $Q_{max}$ ) results between Transurethral Resection of The Prostate (monopolar and bipolar TURP) and Transurethral Vaporization of The Prostate (PVP, ThuVAP, Biolitec, TUEVP, BPV). **Material & Methods:** Articles were obtained through online searches using Medline, Google Scholar, and Cochrane Library using keywords Transurethral Resection of The Prostate (TURP) dan Transurethral Vaporization of The Prostate (TUVP) and IPSS or  $Q_{max}$ . **Results:** A total of 6 RCTs and 3 Cohort consisted of 1212 BPH patients treated with TURP (B-TURP and M-TURP) or TUVP (TUVP, BPV, Biolitec, ThuVAP, GLVP(PVP)). There is a significant difference result of IPSS score and  $Q_{max}$  at the third month of follow-up after both therapies. **Conclusion:** The post-operative IPSS score and  $Q_{max}$  results at the third month of follow-up in BPH patients treated with TURP or TUVP presents varied results. TURP has a better post-operative IPSS score compared to Biolitec Laser, but not superior when compared with TUEVP, BPV, ThuVAP, and PVP. Notably, TURP has better post-operative  $Q_{max}$  results than BPV, TUEVP, and ThuVAP, but not when compared with PVP.

**Keywords:** BPH, TURP, TUVP, IPSS,  $Q_{max}$ .

## ABSTRAK

**Tujuan:** Tinjauan sistematis ini bertujuan untuk membandingkan hasil skor IPSS dan uroflowmetri ( $Q_{max}$ ) antara terapi Transurethral Resection of The Prostate (monopolar dan bipolar TURP) dan Transurethral Vaporization of The Prostate (PVP, ThuVAP, Biolitec, TUEVP, BPV). **Bahan & Cara:** Artikel didapatkan melalui penelusuran secara online menggunakan Medline, Google Scholar, dan Cochrane Library menggunakan kata kunci keywords Transurethral Resection of The Prostate (TURP) dan Transurethral Vaporization of The Prostate (TUVP) dan IPSS atau  $Q_{max}$ . **Hasil:** Terdapat 6 RCT dan 3 Cohort, terdiri dari total 1212 pasien BPH yang diterapi TURP (M-TURP dan B-TURP) atau TUVP (TUEVP, BPV, Biolitec, ThuVAP, GLVP (PVP)). Terdapat perbedaan hasil IPSS dan  $Q_{max}$  yang signifikan pada follow-up bulan ketiga pasca terapi TURP atau TUVP. **Simpulan:** Penelitian ini menemukan bahwa hasil IPSS dan  $Q_{max}$  post-operatif follow-up bulan ketiga pada pasien BPH yang diterapi dengan TURP atau TUVP memiliki hasil yang bervariasi. TURP memberikan hasil skor IPSS post-operatif yang lebih baik dibandingkan Biolitec laser, namun sebaliknya jika dibandingkan TUEVP, BPV, ThuVAP, dan PVP. TURP memberikan hasil  $Q_{max}$  post-operatif yang lebih baik dibandingkan BPV, TUEVP, dan ThuVAP, namun sebaliknya dibandingkan PVP.

**Kata Kunci:** BPH, TURP, TUVP, IPSS,  $Q_{max}$ .

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## INTRODUCTION

The world's elderly population is increasing rapidly. In general, according to United Nations (UN) records, the elderly population has doubled in just 25 years. The United Nations predicts that the number of elderly people will reach 600 million worldwide, or the equivalent of 8% of total world population and will continue to increase 1.1 billion or 13% in 2035.<sup>1</sup>

Benign Prostate Hyperplasia (BPH) is one of the common processes affecting elderly men. Among men aged 80 or older, 90% showed histological evidence, 81% had symptoms associated with BPH, and another 10% had urinary retention. BPH rarely occurs before the age of 40%, an average of 50% of men show symptoms of BPH by the age of 50. The incidence of BPH increases by 10% every decade and reaches 80% by the age of 80 years. 75% of men >50 years suffer BPH symptoms, and 20%-30% of men who reach 80 years of age require surgical intervention for the management of BPH.<sup>2</sup>

Transurethral Resection of the Prostate (TURP) remains the gold standard procedure for BPH, but there are alternative therapies, one of which is TUVP presenting the most promising alternative therapy for BPH.<sup>3</sup> The International Prostate Symptom Score (IPSS) is a measurement tool commonly used to assess the severity of symptoms in BPH. The IPSS questionnaire consists of 7 questions on LUTS symptoms (imperfect emptying, frequency, intermittency, urgency, etc.).<sup>4</sup> Uroflowmetry is a non-invasive urodynamic measurement tool widely used for patients with suspected lower urinary tract symptom dysfunction.<sup>5</sup>

The variety of studies results and the application of therapy in patients with BPH encourage the researcher to examine the differences in outcomes of both treatments, especially IPSS and Qmax in TURP and TUVP in patients with BPH.

## OBJECTIVES

This systematical review aimed to evaluate the comparison of the effect between Transurethral Resection of The Prostate (TURP) and Transurethral Vaporization of The Prostate as therapy for the patient with Benign Prostate Hyperplasia (BPH).

## MATERIAL & METHODS

The literature search was conducted using Medline, Google Scholar, and Cochrane Library databases. The search and screening process was performed according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The main keyword used during the search were Transurethral Resection of The Prostate and Transurethral Vaporization of the Prostate. The measured variables were: International Prostate Symptom Score (IPSS) and Uroflowmetry (Qmax).

This systematic review included observational and randomized controlled trial design studies which compare TURP and TUVP. Non-research studies such as book chapters, systematical reports, conference papers, and review articles were excluded. Data were extracted with a data collecting form modified from Cochrane.

The risk bias assessment was performed to assess the quality of each included article. The articles were assessed using Joanna Briggs Institute (JBI) quality assessment tools for randomized trials and cohort, which were assessed with several questions. Each included article was presented in the baseline characteristic table. The studies author, year, intervention, total sample, age by years, prostate volume, follow-up duration, Pre-operative IPSS score, and pre-operative Qmax.

## RESULTS

A total of 9 articles were included in this systematic review. Screening and selection of each studies using Rayyan application. The Rayyan application used for combining, removing duplicate, and excluding study with wrong population, intervention, language, and study design. The flow of this research is briefly described in the prism flowchart in Figure 1.

There are total 6 articles with RCT's design study and 3 articles with cohort design study. 1 study evaluating BPV therapy, 1 study comparing b-TURP and BPV, 1 study comparing BPV and GLVP (PVP), 1 study comparing BPV and laser (Biolitec). 1 study comparing, TURP and ThuVAP, 2 study comparing TURP and TUEVP, 1 study comparing b-TURP and m-TURP, and 1 study comparing BPV and PVP.

The total of 1212 samples in this study were divided into TURP (M-TURP and B-TURP) group and TUVP (BPV, TUEVP, PVP/GLVP, Biolitec, and ThuVAP) group. 439 samples in group TURP and 773 samples in group TUVP

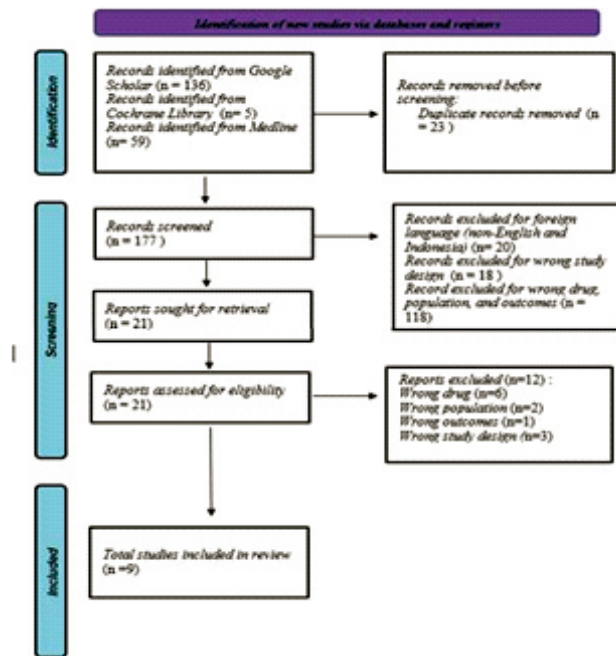


Figure 1. PRISMA Flow Chart.

Table 1. Study Subjects Characteristic.

Study	Year	Design	Patients	Intervention	Follow-up
Hermanns, et.al.	2019	Prospective Cohort	75	Bipolar Plasma Vaporization	6 <sup>th</sup> weeks, 6 <sup>th</sup> months, 12 <sup>th</sup> months, 3 <sup>rd</sup> years
Abdelwahab, et.al.	2019	Randomized Prospective Trial	99	TURP and BPV	1 <sup>st</sup> months, 3 <sup>rd</sup> months, 9 <sup>th</sup> months
Aboutaleb, et.al.	2018	Retrospective Cohort	155	Bipolar Plasma Vaporization and Green Light Vaporization (GLVP/PVP)	3 <sup>rd</sup> months
Skinner, et.al.	2017	Randomized Controlled Trial	55	Bipolar Plasma Vaporization and Biolitec Laser	6 <sup>th</sup> weeks, 3 <sup>rd</sup> months
Hashim, et.al.	2020	Randomized Controlled Trial	407	Bipolar Plasma Vaporization and Biolitec Laser	12 <sup>th</sup> months
Saini, et.al.	2017	Randomized Controlled Trial	70	ThuVAP and TURP	1 <sup>st</sup> weeks, 1 <sup>st</sup> months, 3 <sup>rd</sup> months
Chetan, et.al.	2020	Randomized Controlled Trial	80	TUEVP and TURP	3 <sup>rd</sup> months
Srinath, et.al.	2018	Randomized Controlled Trial	120	TUEVP and TURP	1 <sup>st</sup> months, 3 <sup>rd</sup> months, 6 <sup>th</sup> months
Rai, et.al.	2017	Cohort Retrospective	165	M-TURP and B-TURP PVP and BPV	1 <sup>st</sup> months, 3 <sup>rd</sup> months, 6 <sup>th</sup> months, 12 <sup>th</sup> months, 18 <sup>th</sup> months

**Table 2.** Study Baseline and Post-Operative Data (1).

Variable	Herman ns, <i>et.al.</i>	Abdelwahab, <i>et.al.</i>	Aboutaleb, <i>et.al.</i>	Skinner, <i>et.al.</i>	Hashim, <i>et.al.</i>	Chetan, <i>et.al.</i>					
Therapy		b-TURP	BP	GLV	BP	Biolitec	BPV	ThuVARP	TURP	TUEV	TURP
BPV			V	P	V					P	P
Pre-Operative Prostate Volume (g)	41	58.2	59.4	43	45	47.8	46.6	35	40	51.9	50.9
<b>IPSS (point) (Mean)</b>											
Baseline	16	19.9	19.1	23	22	20.5	22.6	21.74	22.56	24.8	24.8
6 POW	8	-	-	-	-	10	11	-	-	-	-
1 POM	-	7.8	7.9	-	-	-	-	-	-	-	-
3 POM	3	6.8	6.9	8.3	8.61	9.8	9.8	9.2	10.0	4.2	3.6
6 POM	-	-	-	-	-	-	-	-	-	-	-
9 POM	3	5.2	6.9	-	-	-	-	-	-	-	-
12 POM	-	-	-	-	-	-	-	6.43	6.26	-	-
18 POM	3	-	-	-	-	-	-	-	-	-	-
36 POM	-	-	-	-	-	-	-	-	-	-	-
<b>Qmax (mL/s) (Mean)</b>											
Baseline	14.7	8.1	9	13	12	-	-	8.9	8	8.36	7.73
6 POW	-	-	-	-	-	-	-	-	-	-	-
1 POM	-	18.1	17.2	-	-	-	-	-	-	-	-
3 POM	-	18.7	17.9	25	25	-	-	20.16	23.2	10.4	11.6
6 POM	17.0	-	-	-	-	-	-	-	-	-	-
9 POM	-	19.1	18.3	-	-	-	-	-	-	-	-
12 POM	16.6	-	-	-	-	-	-	-	-	-	-
18 POM	-	-	-	-	-	-	-	-	-	-	-
36 POM	16.3	-	-	-	-	-	-	-	-	-	-

**Table 3.** Study Baseline and Post-Operative Data (2).

Variable	Rai P., <i>et.al.</i>	Saini., <i>et.al.</i>	Srinath., <i>et.al.</i>					
Therapy	PVP	BPV	PVP	BPV	M-TURP	B-TURP	TUEPV	TURP
Pre-Operative Prostate Volume	64.1	62.9	43.7	44.1	64	66	52	50
<b>IPSS (point) (Mean)</b>								
Baseline	25.3	24.8	24.9	24.4	28.53	29.40	29.31	27.77
6 POW	-	-	-	-	-	-	-	-
1 POM	5.1	5.9	5.3	6.1	8.07	7.60	5.46	44
3 POM	4.8	5.1	4.9	5.3	8.63	7.60	4.03	-
6 POM	4.0	4.2	4.2	4.4	8.10	7.60	-	-
9 POM	-	-	-	-	-	-	-	-
12 POM	3.9	4.1	4.1	4.1	-	-	-	-
18 POM	3.9	4.0	3.8	4.1	-	-	-	-
36 POM	-	-	-	-	-	-	-	-
<b>Qmax (mL/s) (Mean)</b>								
Baseline	5.3	4.8	4.9	5.5	7.73	7.75	8.16	7.87
6 POW	-	-	-	-	-	-	-	-
1 POM	21.4	20.9	20.9	20.1	18.90	16.23	17.76	17.3
3 POM	21.9	21.3	21.7	21.1	18.93	16.37	-	-
6 POM	22.3	22.1	21.6	21.7	19.13	16.47	-	-
9 POM	-	-	-	-	-	-	-	-
12 POM	22.8	22.4	22.4	22.1	-	-	-	-
18 POM	22.8	22.5	22.4	22.1	-	-	-	-
36 POM	-	-	-	-	-	-	-	-

## DISCUSSION

IPSS Questionnaire was first developed by the American Urological Association (AUA). IPSS is reliable, valid, sensitive, and responsive. WHO suggested IPSS as an important instrument in the assessment for BPH.<sup>6</sup>

Srinath, et.al found that B-TURP and M-TURP yielded significant efficacy and equivalent result at the sixth month postoperative follow-up. M-TURP is a safe procedure (mortality > 0.25%) but has intraoperative complications (blood loss, with 2.5-8.6% transfusion ratio and TUR syndrome) whereas B-TURP with normal saline as an irrigation fluid gives a lower complication effect.<sup>7</sup> Hermanns, et.al., found that patients treated with BPV, there was significant improvement in IPSS score at the sixth week and sixth month follow-up, 8 points and 3 points. Average IPSS score consistent at first and third year.<sup>8</sup>

Abdelwahab, et.al. found there was no significant difference in post-operative IPSS score between BPV and TURP.<sup>9</sup> Hashim, et.al. found ThuVARP and TURP show insignificant difference post-operative IPSS score results (ThuVARP:6.43, TURP: 6,26).<sup>10</sup> Aboutaleb, et.al found similar results between BPV and GLVP (PVP), there was no significant difference between both therapies, 8.6 points after BPV and 8.3 points after GLVP.<sup>11</sup>

Skinner, et.al. found insignificant difference post-operative IPSS score between BPV and Biolitec Laser.<sup>12</sup> Saini, et.al. and Chetan, et.al. found there was no significant efficacy difference between TUEVP and TURP in patient with BPH.<sup>3,13</sup> Rai, et.al. found there was a significant IPSS score improvement since first month in patient treated by PVP and BPV, and consistent at third month, sixth month, twelfth month, and eighteenth months.<sup>14</sup>

In patients with severe LUTS symptom (20-35 score), the IPSS results were comparable in third month follow-up. IPSS score in patients treated by TURP increased by 55.67% (22.56- 10.0), in patients treated by BPV increased by 60.8% (22.0-8.61), in patients treated by TUEVP increased by 83% (24.8-42), in patients treated by PVP increased by 78.2 (24.4-5.3), in patients treated by Biolitec Laser increased by 52.1% (20.5-9.8), in patients treated by ThuVARP increased by 57.6% (21.74-9.2). The following data were obtained : TURP < BPV, TURP < TUEVP, TURP < PVP, TURP > Biolitec, and TURP < ThuVARP.

Uroflowmetry has been a useful study in the diagnosis and management of LUTS associated with BPH and urethral strictures. Previous studies have established its utility in detecting post-operative stricture recurrence, whereby Qmax < mL/s, Qmax < 15 mL/s, and Qmax < 15 mL/s is safe screening tools.<sup>15</sup>

Srinath, et.al. found clinically B-TURP has similar efficacy with M-TURP on Qmax.<sup>7</sup> Hermanns, et.al. found improvement in post-operative Qmax results in sixth month follow-up, 16.6 mL/s, with pre-operative value was 10.1 mL/s. After sixth month and 3 years follow-up, Qmax value not significant improved.<sup>8</sup> Abdelwahab, et.al. found there was an improvement in Qmax in Bipolar TURP and BPV (17 mL/s and 18 mL/s), the results show insignificant difference between both therapies.<sup>9</sup> Hashim, et.al. found TURP had a better effect on post-operative Qmax than ThuVARP in BPH patients. Qmax of 23.24 mL/s was found in patients treated with TURP, while 20.16 mL/s in patients treated with ThuVARP.<sup>10</sup>

Aboutaleb, et.al. found there was no significant difference between BPV and GLVP (PVP). Post-operative Qmax in BPH patient treated by BPV increased from 12 mL/s to 25 mL/s, meanwhile in patients treated with GLVP increased from 12 mL/s to 25 mL/s.<sup>11</sup> Saini, et.al. and Chetan,<sup>3,13</sup> et.al. found there was no significant difference between TUEVP and TURP, in patients treated with TUEVP Qmax increased from 8.16 mL/s to 17.76 mL/s at third month follow-up and in patients treated with TURP Qmax increased from 7.87 mL/s to 17.3 mL/s. Chetan et.al. found an higher improvement in patients treated with TUEVP compared to TURP (150,6%: 124,5%). Rai, et.al, found there was no significant post-operative Qmax difference between PVP and BPVP.<sup>14</sup>

In patients with Qmax < 15 mL/s, post-operative Qmax were comparable in third month follow-up. The Qmax results in patients treated with TURP increased by 65.5% (8-23.2 mL/s), in patients treated by BPV increased by 49.7 (9-17.9 mL/s), in patients treated by TUEVP increased by 54.5% (8.16-17.76 mL/s), in patients treated by PVP increased by 73.9% (5.5-21.1 mL/s), in patients treated by ThuVARP increased by 55.8% (8.9-20.1 mL/s). The following data were obtained: TURP > BPV, TURP > TUEVP, TURP < PVP, and TURP > ThuVARP.

However, each reviewed article had a different post-operative follow-up duration, the different follow-up durations between treatments in each reviewed article is a limitation in this study.

## CONCLUSION

TURP have better post-operative IPSS score compared to Biolitec Laser and the opposite when compared with TUEVP, BPV, ThuVARP, and PVP. TURP have better post-operative Qmax results compared to BPV, TUEVP, and ThuVARP and the opposite when compared with PVP.

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