

Comparing Posterior Tibial Nerve Stimulation Methods In Women With Idiopathic Overactive Bladder

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Introduction

Posterior tibial nerve stimulation (TNS) is an effective treatment for overactive bladder (OAB). While percutaneous TNS (PTNS) is proven to be effective, it is time-consuming and costly. In contrast, transcutaneous TNS (TTNS) is non-invasive, affordable, and can be self-administered at home.

This study aims to evaluate the non-inferiority of TTNS compared to PTNS in the management of idiopathic OAB in women.

Method

Between January 2022 and 2024, a retrospective comparative observational study was conducted at a urogynecology clinic in Victoria involving women with idiopathic overactive bladder (OAB) unresponsive to first-line treatment.

Participants received either percutaneous tibial nerve stimulation (PTNS) (Figure 1) or transcutaneous tibial nerve stimulation (TTNS) (Figure 2) for 12 weeks. The TTNS group self-administered daily 30-minute sessions at home after physiotherapist instruction, while the PTNS group received weekly 30-minute sessions from a continence nurse.

Tibial nerve stimulation (TNS) modulates sacral plexus activity (S2–S4) via afferent fibers of the tibial nerve (L5–S3), inhibiting detrusor overactivity.



Figure 1. PTNS with needle gauge

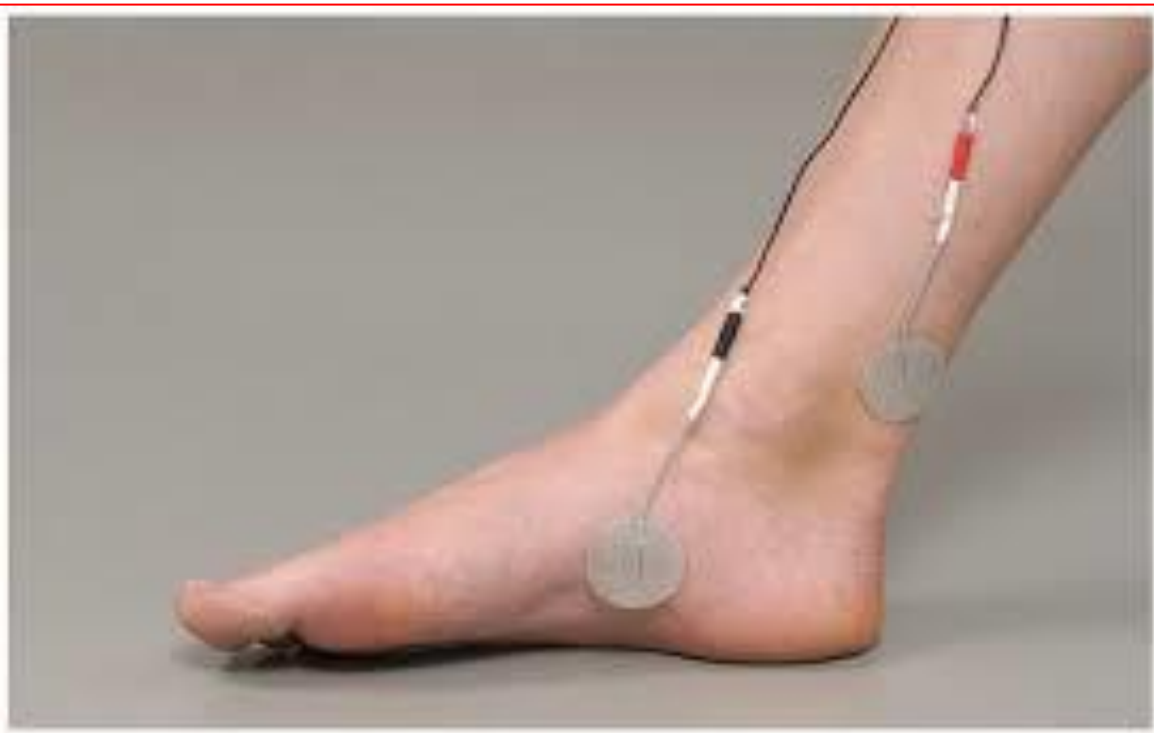


Figure 2: TTNS with surface electrode

Outcomes were assessed using a voiding diary (tracking daytime frequency, nocturia, urgency, and leakage) and the Incontinence Quality of Life (I-QOL) questionnaire. Data were collected at baseline and at 12 weeks. Statistical significance was set at $p < 0.05$.

Results

A total of 80 women were included: 45 received PTNS and 35 received TTNS. The TTNS group was significantly younger, with a mean age of 64 years (SD 15.5) compared to 72 years (SD 12.7) in the PTNS group ($p = 0.008$).

Pre-treatment urge incontinence rates were similar (TTNS: 82.9% [29/35]; PTNS: 80% [36/45]; $p = 0.78$). Both groups showed significant improvements in daytime frequency and nocturia at 12 weeks compared to baseline ($p < 0.05$).

However, a significant reduction in urge incontinence episodes was observed only in the TTNS group ($p < 0.001$). At 12 weeks, the TTNS group showed greater improvement in nocturia ($p < 0.001$) and urge incontinence episodes ($p = 0.03$) compared to the PTNS group. (Table 1)

Table 1 Demographic data and comparison of treatment groups in assessment variables before and after 12-week treatment.

	TTNS Group (n=35)			PTNS Group (n=45)			p-value
Age (mean, SD)	64 (15.5)			72 (12.7)			0.008
Parity (mean, SD)	2.5 (1.4)			2.2 (1.4)			0.06
Menopause (n, %)	32/35 (91.1)			37/45 (82.2)			0.33
Use of topical estrogen (n, %)	20/35 (57.1)			14/37 (36.8)			0.15
UI (n, %)	29/35 (82.9)			36/45 (80)			0.78
	Pre-treatment	Post-treatment	p-value ^a	Pre-treatment	Post-treatment	p-value ^a	p-value ^b
Daytime Frequency (n)							
≤7	8	19	0.007	4	17	0.001	0.14
8-10	12	11	0.80	37	21	0.004	0.17
11-15	12	3	0.009	4	4	1	0.96
>15	3	0		0	0		
Nocturia (n)							
0-1	12	30	<0.001	5	14	0.020	<0.001
2-4	20	3	<0.001	36	26	0.023	<0.001
>5	4	0		3	3	1	0.25
UI in 24 hours (n)	30	14	<0.001	36	29	0.10	0.030

UI = Urge urinary incontinence.
TTNS –transcutaneous tibial nerve stimulation, PTNS – percutaneous tibial nerve stimulation
^a $p < 0.05$: compared with baseline values within groups.
^b $p < 0.05$: compared post-treatment vales between the two groups

Results

Treatment satisfaction was significantly higher in the TTNS group (74% [26/35]) versus the PTNS group (35% [16/45]; $p < 0.0007$). No serious adverse events were reported in either group. (Table 2)

Table 2 I-QOL OAB symptom improvement at end of 12 weeks treatment of TTNS and PTNS

	Very much and much improved	Minimal or No improvement	p-value
TTNS (n=35)	26	9	0.0007
PTNS (n=45)	16	29	

*TTNS –transcutaneous tibial nerve stimulation, PTNS – percutaneous tibial nerve stimulation

Conclusion

Both TTNS and PTNS improved OAB symptoms after 12 weeks of treatment. However, TTNS was associated with greater reductions in nocturia and urge incontinence episodes, potentially influenced by the younger age of participants in this group.

TTNS also resulted in higher patient satisfaction, highlighting its potential as a convenient, home-based therapy, though further randomized controlled trials are needed to validate these findings.

References

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