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Systematic review

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# Effect of eletroestimulation in the posterior tibial nerve for hiperative bladder in women: systematic review

# Efeito da eletroestimulaçao no nervo tibial posterior para bexiga hiperativa em mulheres: revisão sistemática

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**RESUMO | INTRODUÇÃO:** A bexiga hiperativa é uma condição que tem como principal causa a hiperatividade do músculo detrusor e que afeta muitas mulheres. Tem origem idiopática quando não está vinculada a outra patologia. Em contrapartida, quando possui origem neurogênica, tem como causas alterações neurológicas associadas ao mecanismo da micção. Os tratamentos utilizados para a bexiga hiperativa são medicamentoso, fisioterapia e terapia comportamental. Um dos métodos utilizados na fisioterapia é a eletroestimulação do nervo tibial posterior (PTNS), cujo objetivo é impossibilitar a contração involuntária do músculo detrusor de forma exacerbada. **OBJETIVO:** Identificar o efeito do uso da eletroestimulação percutânea no nervo tibial posterior como forma de tratamento em mulheres com diagnóstico de bexiga hiperativa associada à perda urinária. **MATERIAIS E MÉTODOS:** Uma revisão sistemática de literatura, que utilizou artigos de ensaios clínicos randomizados encontrados na base de dados Cochrane. A busca dos artigos foi realizada por dois revisores no período compreendido entre agosto e outubro de 2017, realizada de seguinte forma (Urinary Bladder, Overactive AND Tibial nerve AND Transcutaneous Electric Nerve Stimulation). Resultados: Foram encontrados 17 artigos; destes, 4 foram selecionados. As variáveis dos artigos analisados foram noctúria, urgência miccional, qualidade de vida, frequência urinária. O PTNS apresentou-se como um método eficaz para o controle da frequência urinária, a noctúria e a incontinência urinária de urgência. **CONCLUSÃO:** O tratamento através da eletroestimulação percutânea no nervo tibial posterior (PTNS) torna-se um método eficaz, para o controle da frequência urinária, a noctúria e a incontinência urinária de urgência, garantindo a melhora dos sintomas da bexiga hiperativa referida pelos pacientes.

**PALAVRAS-CHAVE:** Nervo tibial. Bexiga urinária hiperativa. Estimulação elétrica nervosa transcutânea.

**ABSTRACT | INTRODUCTION:** The overactive bladder is a condition that has the main cause of detrusor hyperactivity and affects many women. It has an idiopathic origin when it is not linked to another pathology. . n contrast, when it has neurogenic origin, its causes are neurological changes associated with the micturition mechanism. The treatments used for the overactive bladder are drug therapy, physiotherapy and behavioral therapy. One of the methods used in physiotherapy is the electrostimulation of the posterior tibial nerve (PTNS), whose objective is to prevent the involuntary contraction of the detrusor muscle in an exacerbated way. **OBJECTIVE:** To identify the effect of the use of percutaneous electrostimulation on the posterior tibial nerve as a form of treatment in women diagnosed with overactive bladder associated with urinary loss. **MATERIALS AND METHODS:** A systematic literature review using articles from randomized controlled trials found in the Cochrane database. The search of the articles was performed by two reviewers in the period between August and October 2017, performed as follows (Urinary Bladder, Overactive AND Tibial nerve AND Transcutaneous Electric Nerve Stimulation). Results: 17 articles found; of these, 4 were selected. The variables of the analyzed articles were nocturia, urinary urgency, quality of life, urinary frequency. PTNS presented as an effective method for the control of urinary frequency, nocturia and urge incontinence. **CONCLUSION:** Treatment by percutaneous electrostimulation in the posterior tibial nerve (PTNS) becomes an effective method for the control of urinary frequency, nocturia and urinary incontinence of urgency, guaranteeing the improvement of the symptoms of overactive bladder referred by the patients.

**KEYWORDS:** Tibial nerve. Urinary bladder. Transcutaneous electric nerve stimulation.

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## Introduction

The overactive bladder is a lower urinary tract dysfunction, which may be accompanied by urinary urgency, increased nocturnal urinary frequency and associated diurnal frequency; in addition, it may not be associated with urinary incontinence. This dysfunction has as its main cause the detrusor muscle hyperactivity[1-5].

The overactive bladder is idiopathic when it is not linked to another pathology; on the other hand, when it has neurogenic origin, its causes are neurological changes associated with micturition[1,5]. It is estimated that in 2018, 546 million people will develop some symptom of overactive bladder. Although there is no exact value, it is considered that 10-17% of the world population has already had some symptom of overactive bladder[6,7,8].

Regarding the treatments, these can be through medications with the use of anticholinergics. However, they can cause side effects and lead the affected person to give up treatment[1,5,9]. Another method of treatment is through the use of behavioral therapy, in which patients are advised on urinary control and volume[1].

In addition to these, it is added the Physiotherapy that performs the electrostimulation of the posterior tibial nerve, whose objective is to prevent the involuntary contraction of the detrusor muscle in an exacerbated way[10]. The posterior tibial nerve is composed of motor and sensory fibers that emerge from L5-S3, where some fibers of the parasympathetic nervous system (SNP) also originate, which are responsible for the innervation of the bladder. The stimulus provided to this nerve causes reduction of the involuntary contraction of the detrusor muscle, and has as main advantages the low cost and the absence of adverse reactions[6,11].

However, there is a need for scientific evidence regarding the effectiveness of this resource for the control of overactive bladder symptoms in order to establish it safely and routinely in the conventional treatment of these patients. Therefore, the present study aimed to identify the effect of the use of percutaneous electrostimulation in the posterior tibial nerve as a form of treatment in women diagnosed with overactive bladder associated with urinary loss.

## Materials and methods

The study is a systematic literature review according to the methodology proposed by Cochrane Collaboration, which analyzed the effects of percutaneous electrostimulation on the tibial nerve in women with overactive bladder. The search was carried out in the Cochrane Library, and the following descriptors were used: tibial nerve, urinary bladder transcutaneous electric nerve stimulation with the boolean operator (AND) without delimitation of time and language. The search for the articles was performed by two reviewers in the period between August and October 2017, performed as follows (Urinary Bladder, Overactive AND Tibial nerve AND Transcutaneous Electric Nerve Stimulation).

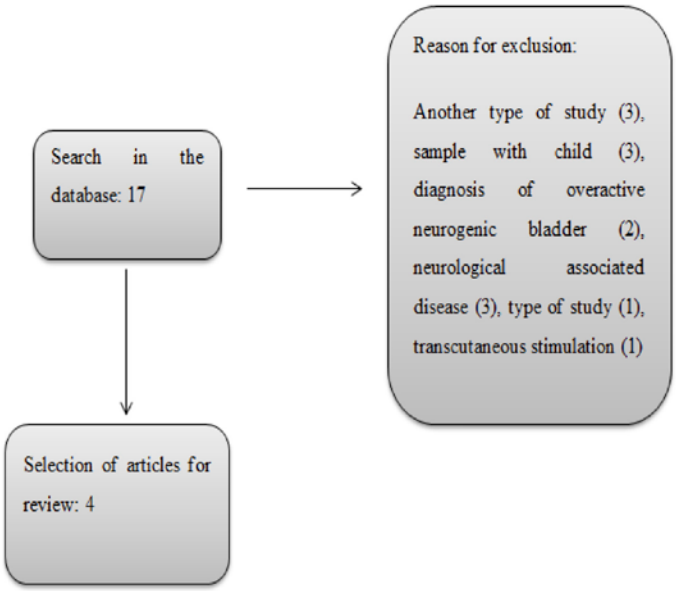
After the initial search of articles, analysis of titles, analysis of abstracts and exclusion of duplicates, a final selection of articles was obtained. Randomized clinical trials comparing percutaneous electrical stimulation of the posterior tibial nerve (PTNS) with other therapeutic forms were selected for this review. We included articles published in all languages, which analyzed female patients, adults, diagnosed with overactive bladder and presented associated urinary loss.

Articles that used only other forms of therapeutic resources such as medication and/or surgery to control the symptoms of overactive bladder were excluded, referring exclusively to patients' quality of life, using children in their samples, not intervention, as well such as those that did not specify the type of intervention performed.

## Results

17 items were found. After the research, the articles were read in full and of these thirteen were excluded, resulting in four articles for methodological analysis, Figure 1.

**Figure 1.** Selection of articles according to inclusion criteria of randomized clinical trials comparing Electric Tibial Posterior Nerve Stimulation (PTNS)




The analyzed articles presented different treatments for Hyperactive Bladder compared to percutaneous posterior tibial nerve stimulation, namely pharmacological therapy and pelvic floor muscular training.

The sum of the patients included in the studies is a total of 186 participants. The variables found in the analyzed articles were nocturia, urinary urgency, quality of life, urinary frequency. As a result it can be observed that PTNS presented as an effective method for the control of urinary frequency, nocturia and urge incontinence, evaluated through the three day urinalysis. The validated instruments were also used to evaluate and identify the quality of life variable: Overactive Bladder questionnaire Short Form (OAB-q SF), International Consultation on Incontinence-Short Form (ICIQ-SF), International Consultation on Incontinence-OAB (ICIQ -OAB), Patient Perception of Intensity of Urgency Scale (PPIU-S) and Patient Global Impression of Improvement Questionnaire (PGI-I), Table 1.

**Table1.** Description of analyzed articles Randomized clinical trials comparing Posterior Tibial Nerve Stimulation (PTNS)

| ARTICLE | PATIENTS | INTERVENTION | PARAMETERS | DURATION OF TREATMENT | INSTRUMENTS | DISCHARGE | KIND OF STUDY |
|---|---|---|---|---|---|---|---|
| **Scaldazza et al., 2017** | 60 patients | G1 = ES + PFMT<br><br>G2 = PTNS | G1 = Frequency: 20 Hz for 30 seconds, alternating 5 Hz for 30 seconds.<br><br>G2 = uninformed data reported by the authors. | G1 = 1 hour, 3x / week + PFMT<br><br>G2 = 30 min, 2x / week for 6 weeks. | OAB-q SF, PPIU-S, PGI-I. | There was an improvement in both groups when compared to quality of life, nocturia and incontinence, but patients submitted to PTNS had better results. | Randomized trial |
| **Preyer et al., 2015** | 32 patients | G1 = PTNS<br><br>G2 = Placebo | G1 = Frequency: 20hz, Pulse Width: 200ms. | G1 = 12 sessions, 30 minutes, 3x / week,<br><br>G2 = 30 minutes, 3x / week | I-QoL | Improvements in the number of incontinence, volume, frequency and quality of life were possible in the PTNS group. | Prospective, double-blind, placebo-controlled study. |
| **Souto et al., 2013** | 58 patients | G1 = TENS<br><br>G2 = Oxybutynin<br><br>G3 = TENS + Oxybutynin | G1 = Frequency: 10 Hz, Pulse width: 250 ls.<br><br>G2 = 10mg.<br><br>G3 = Frequency: 10 Hz, Pulse width: 250ls + 10mg, | G1 = 30min, 2x / week, for 12 weeks.<br><br>G2 = 10mg, 1x / day, for 12 weeks.<br><br>G3 = 30 min, 10.2x / week +, 1x / day for 12 weeks. | ICIQ-SF, ICIQ-OAB, QoL. | All groups had positive results, but the PTNS alone or associated presented more lasting results. | Randomized trial |
| **Finazzi-Agró et al., 2010.** | 36 patients | G1 = PTNS<br><br>G2 = Tolterodine | Data not informed by the authors. | G1 = 30 minutes, 1x / week for 3 months.<br><br>G2 = 2mg, 2x / day for 3 months. | QOL-VAS, QoL, QV. | In both groups there was reduction in incontinence and improvement in quality of life, but no significant results were obtained in relation to urinary frequency. | Randomized clinical trial |

The evaluation of methodological quality and risk of bias occurred through the Cochrane Collaboration, developed to be used in randomized clinical trials. The following components were analyzed: types of randomization, secrecy of allocation, blinding, intention-to-treat analysis, early withdrawal by benefit, selective description of outcome and validated scale. The studies were classified in each item as "low risk" when clearly described, "high risk" when not described and "uncertain risk" if it is not clearly described in the text (Figure 2).

**Table 2.** Randomized controlled trials comparing Posterior Tibial Nerve Stimulation (PTNS)

| Article | Randomized | Allocation secrecy | Blinding | Intention-to-treat analysis | Early withdrawal for benefit | Selective description of outcome | Validated Scale |
|---|---|---|---|---|---|---|---|
| Scaldazza et al. , 2017 | Low risk of bias | Low risk of bias | Low risk of bias | Low risk of bias | Uncertain risk of bias | Low risk of bias | Low risk of bias |
| Preyer et al. , 2015 | Low risk of bias | Low risk of bias | Low risk of bias | Uncertain risk of bias | Uncertain risk of bias | Low risk of bias | Low risk of bias |
| Souto et al. , 2013 | Low risk of bias | Low risk of bias | Low risk of bias | Low risk of bias | Uncertain risk of bias | Low risk of bias | Low risk of bias |
| Finazzi-Agró et al. , 2010 | Low risk of bias | Low risk of bias | Uncertain risk of bias | Low risk of bias | Uncertain risk of bias | Low risk of bias | Low risk of bias |

## Discussion

Among the articles included in the systematic review, it was possible to observe the effect of electrostimulation on the tibial nerve as a form of treatment for women with hyperactive bladder[2-5]. Drugs are the first to be indicated as a form of treatment. The drugs used are anticholinergics, but many patients withdraw from this treatment because of the side effects they present[5-14] in the study of Preyer et al.[13] the group submitted to tolterodine despite the patients mentioning it, the side effect did not characterize an impediment for them to interrupt the treatment.

Kegel in 1946 disclosed pelvic floor muscle training as a therapy for urinary incontinence that was subsequently used as a form of treatment for overactive bladder[15]. This may be used alone or in association with behavioral therapy, or percutaneous electrostimulation in the posterior tibial nerve. The contraction performed on the pelvic floor helps to prevent loss of urine and assists in controlling the bladder by inhibiting its contraction. In one study the patients were divided into groups, one was submitted to PTNS and the other submitted to electrostimulation associated with pelvic floor contraction, patients submitted to PTNS presented improvements when, after treatment were reevaluated for nocturia, urge incontinence and to the volume eliminated, it was identified that the overlap of physiotherapeutic resources does not result in an improvement in the control of hyperactive bladder symptoms[14].

Quality of life was a factor evaluated in the four articles, the symptoms of overactive bladder cause a negative impact on the life of these patients. In the study[13], the Quality of Life (QoL) of the patients was evaluated associated with the Visual Analogue Scale (VAS), which investigates the impact of symptoms on QoL and indicates a high impact in both groups at the beginning of treatment. During and at the end of treatment the quality of life of these women improved considerably in the PTNS group. In the other studies[5,12,14], after the intervention, the patients were evaluated with the quality of life questionnaire and observed that the groups submitted to percutaneous electrostimulation in the posterior tibial nerve obtained an improvement in the quality of life.

Urinary frequency, nocturia and urge incontinence were also evaluated through the three days urinalysis[5,12-14] which aims to record the number of times the patient urinates for 24 hours, and thus with the advancement of this variable can already be evaluated. It was reported in these studies that the patients, when reassessed, obtained improvements in these symptoms.

This study has the advantages of synthesizing information about the topic addressed and the methodological evaluation of the studies. It is considered as limitation the difficulty in establishing greater elucidatory results on the subject due to the methodological divergences of the reviewed articles, regarding the difference of the parameters of electrical stimulation, as well as of the different research instruments used.

## Conclusion

Treatment by percutaneous electrostimulation in the posterior tibial nerve (PTNS) was an effective method to control urinary frequency, nocturia and urgency urinary incontinence when evaluated through the three days urinalysis, which allow the improvement symptoms of overactive bladder. PTNS is therefore considered a first-line treatment, as the drugs are already. However, there is a need for more controlled and randomized studies with more methodological details about the efficacy of percutaneous electrostimulation in the posterior tibial nerve.

### Author contributions

Rufino PTSO participated in the study design, data collection, data analysis, interpretation of the results and the writing of the article. Leme APCBP participated in the design, data collection, data analysis, interpretation of the results and writing of the article.

### Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

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