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A comparative study between parasacral electrostimulation and posterior tibial nerve in the treatment of hypoactive bladder - a literature review

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Abstract: Overactive Bladder (BH) is defined as involuntary urine loss, where the bladder musculature performs involuntary contractions, in the filling phase and in emptying. In adults, detrusor hyperactivity has a significant impact on the patient's quality of life. Show the main effects of application on electrostimulation in the posterior tibial nerve and parasacral electrostimulation in adults in the treatment of overactive bladder. A literature review was conducted from February to March 2020 in the PUBMED and VHL databases. The following descriptors *Physiotherapy* were used; *Electro-stimulation*; *Hyperactive Urinary Bladder*. We found 43 scientific articles, between the years 2015 and 2020, where they addressed various themes, a reading was performed and only 4 were adapted to the objective of the study. Studies investigating the use of electrostimulation in adults are scarce. However, studies of electrostimulation in the posterior tibial nerve show that the effects of this therapy are efficient.

Keywords: Physiotherapy. Electro-stimulation. Hyperactive Urinary Bladder

1. Introduction

The bladder is a muscular organ, which has the function of storing urine until expelled by urination. Its wall is surrounded by the detrusor muscle, which has the ability to stretch four times its rest length, with the aim that there is no increase in linear pressure during filling. The urethra connects to the bladder neck, which has the purpose of moving urine out of the body. In the bladder neck has the internal sphincter that is formed by smooth muscle rings, so the external sphincter is formed by the muscles of the pelvic floor. The sphincters have the function of closing the urethra so that urine leakage does not occur (AOKI *et al*., 2017).

Above all, the bladder, urethra and sphincters work together for the storage and elimination of urine. The structures need to work in sync so that the urine is not involuntarily expelled. Therefore, any change in urination function, can lead to a dysfunction. A dysfunction with high prevalence is the overactive bladder, with prevalence in adults from 12 to 17% of the adult population. According to the economic burden, the annual cost in six Western countries is estimated to cost US$3.9 billion and US$76.2 billion in America alone, with treatment for bladder hyperactivity (ZHAO *et al*., 2018; FONSECA *et al*., 2016).

The International Continence Society (ICS) defines that overactive bladder (BH) is a clinical syndrome characterized by lower urinary tract dysfunctions, with or without urgent incontinence, polyuria, and nocturia. BH implies the patient's quality of life in a negative way, such as anxiety, low esteem, shame, frustration, decreased productivity and social decline. The main risk factors for overactive bladder are: obesity, neurological disorders, chronic constipation, age and numbers of deliveries. Symptoms increase with advancing age (FONSECA *et al*., 2016; MONTEIRO *et al*., 2017).

However, the use of drugs, strengthening of pelvic floor muscles, electrostimulation, neuromodulation, biofeedback and surgical treatment are forms of treatment for overactive bladder. Physiotherapy addresses conservative resources such as pelvic floor muscle training, strengthening of the pelvic floor and exercises that seek control of urination, continuous transcutaneous stimulation (TENS), functional electrical stimulation (FES) and biofeedback. These resources contribute to voiding education, knowledge of the function of the correct use of the muscles of the pelvic floor controle and strengthening (DE PAULA *et al*., 2016) (REIS *et al*., 2015).

Posterior tibial stimulation is a noninvasive technique, with the use of superficial electrodes in the tibial muscle region. This treatment demonstrates efficient therapeutic effects for reducing symptoms of overactive bladder (SHARAN *et al*., 2018). Parasacral stimulation is a noninvasive technique, with the objective of sending nerve impulse to bladder nerve modulation (JOCOMO *et al*., 2020).

It is worth mentioning that at the beginning of treatment, changes in behavior should occur that includes attention to daily fluid intake, prevention of foods that are irritable to bladder such as coffee, chocolate, citrus fruits, alcoholic beverages, spicy foods, perform the necessary treatments for constipation, weight loss if the patient is obese, elaborate a urination diary and emergency elimination techniques (RAJU *et al*., 2020; ARCELISSEN *et al*., 2018).

Due to the complications of involuntary contractions of the bladder musculature, which is directly related to involuntary urine loss, this research is justified by the application of physical therapy techniques in contribution to its target audience and the benefits of treatment with the use of electrostimulation in symptoms caused by the overactive bladder.

The present study aimed to show the main effects and comparison of the application of electrostimulation in posterior tibial nerves and parasacral electrostimulation in the treatment of overactive bladder.

2. Methodology

This present study constitutes a review of the integrative literature regarding the use of parasacral electrostimulation and stimulation in the posterior tibial nerve comparing the two stimulations in the treatment of overactive bladder. Data collection was performed from February to March 2020, and the Databases Literature Virtual Health Library (VHL) and the National Library of Medicine of the United States (PUBMED) were used for research. Articles written in English, Portuguese, Portuguese and Spanish were selected. The following inclusion criteria were defined: articles published from 2015 to 2020, the descriptors in health sciences (ESSC) were considered as a physiotherapy inclusion criterion; Electro-stimulation; Hyperactive Urinary Bladder.

Exclusion criteria: Articles that were not complete, articles with other pathologies and other treatments. As results, 43 original articles were obtained, however, 4 articles met the inclusion criteria. After the selection of the articles that met the defined inclusion criteria, exploratory reading was performed, followed by selective reading and choice of the material that adapted to the objectives and theme of the article, reading the analysis of the texts, ending with the realization of descriptive and interpretative reading.

3. Results and Discussion

Based on the inclusion and exclusion criteria, 43 articles initially searched in the databases were selected. After the brief analysis of the titles and abstracts, 39 articles were excluded because they did not fit the research.

After reading, 6 articles were selected, the selected data were: title, author, year, objectives and conclusion (Table 1).

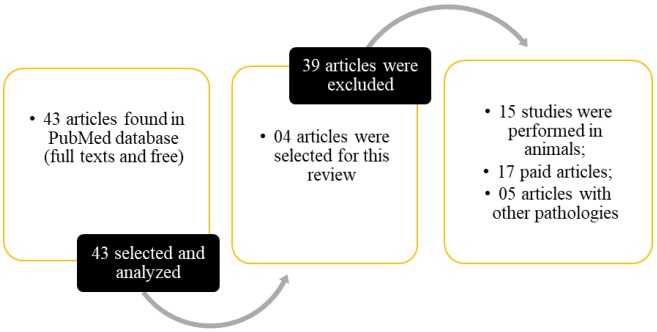

Figure 1. Flowchart of the search result, selection and inclusion of the studies.

Table 1. Search result describing, author, objective, results and conclusion

Title	Author and Year	Goal	Findings	Conclusion
Posterior tibial transcutaneous nerve stimulation versus extended-release oxybutynin in overactive bladder patients. A prospective randomized trial	MANRÍQUEZ *et al*., 2015	Compare parameters of efficacy, safety, quality of life and patient satisfaction in patients treated with two different therapies for OAB symptoms.	70 patients: E.R.O. Group 34 received 10mg of muscarinics, grupo of electro stimulation in the tibial nerve received for 12 weeks, 2 sessions per week of 30 minutes, 20 Hz of 200 cycles. In the end, 70% of electrostimulation and 60% of the E.R.O. group had improvements and 50% reduction in urinary frequency.	This study demonstrated efficacy of E.R.O. and electrostimulation in women with detrusor hyperactivity, but greater improvements were found with electrostimulation in the tibial nerve.
Pelvic Floor Muscle Training with Or Without Tibial Nerve Stimulation and Lifestyle Changes Have Comparable Effects on The Overactive Bladder. A Randomized Clinical Trial	BYKOVIENE *et al*., 2018	Compare the effects of transcutaneous stimulation of the posterior tibial nerve and pelvic floor muscle training in women with overactive bladder syndrome (OAB).	A total of 67 women, only 61 completed the study. They were divided into 3 groups I, II and III.	All three treatments lead to an effective reduction in short-term urgency in women with overactive bladder, but a long-term efficacy assessment is required.
Transcutaneous tibial nerve stimulation versus *Parasacral* stimulation in the treatment of overactive bladder in elderly people: a triple-blinded randomized controlled trial	JOCOMO *et al.* , 2020	Evaluate the effect of transcutaneous tibial nerve stimulation (TTNS) and transcutaneous *stimulation of parasacral in* the treatment of overactive bladder in the elderly and compare the final results between groups.	Fifty-eight patients were selected, being divided into 2 groups, TTNS (G1) and *parasacral transcutaneous stimulation* (G2). Biphasic current and superficial electrodes were used, 8 sessions of 30 minutes, twice a week.	It is concluded that the two proposed treatments are effective for the treatment of overactive bladder.
Non-invasive transcutaneous electrical stimulation in the treatment of overactive bladder	ESLOVACA *et al*., 2015	The aim of this study was to address stimulation site, stimulus parameters, neural structures that are thought to be directed and the clinical and urodynamic results achieved in a patient with overactive bladder.	16 articles were used to construct the article, prioritizing studies that have evidence of the use of *parasacral electrostimulation* and in the posterior tibial nerve.	The study concluded that there is tantalizing evidence of the effectiveness of the transcutaneous stimulation approach, although larger placebo-controlled studies are needed to provide a robust evidence base. The standardization of the methodology of future trials is important to allow for

				comparations between studies and stimulation protocols.

Source: Search data

Manríquez *et al*., 2015, when observing patients submitted to electrostimulation and oxybutynin use, evaluated that the groups presented successful responses to treatment, with a reduction of 50% urinal frequency. In patients who underwent oxybutynin, nine of them demonstrated dry mouth. Regarding electrostimulation, patients did not present adverse effects, only positive effects. The study by Bykoviene *et al*., 2018 was divided into three groups. Group 1 was the control group; group 2 was the patients submitted to contraction exercises for the pelvic floor musculature and in group 3 was the group of transcutaneous electrostimulations in the posterior tibial nerve. To obtain the results, a questionnaire was applied. Nos three groups did not have significant differences. Group 2 and 3 demonstrated a significant reduction in episodes of urinary incontinence. However, group 3, regarding general perception, the sample improved physical and social limitations. The three groups had no side effects, the results of the three groups regarding urgency had an important reduction after treatment.

Jocomo *et al*., 2020, evaluated the effect of transcutaneous stimulation on the tibial nerve and parasacral transcutaneous stimulation, 50 older women aged 60 to 80 years with clinical diagnosis of detrusor hyperactivity were selected, the participants were divided into two groups of 25 each, the groups were G1- transcutaneous stimulation of the posterior tibial nerve and G2 – transcutaneous stimulation parasacral. The present study demonstrated that both treatments are effective for the treatment of detrusive hyperactivity, so the use of transcutaneous electrostimulation of the posterior tibial nerve had more positive results in relation to parasacral transcutaneous stimulation. The areas that were placed the electrodes offer distinct electrical stimuli in the mechanisms of action, but the intention was the same.

According to Slovak *et al*., 2015, the use of electrostimulation the choice of its parameters, location of the application and the conditions and symptoms shown in the selected study, does not follow any pattern, are in several ways. Patients submitted to treatment had no long-term follow-up. However, there is no proof that the treatment has had benefits. Parasacral stimulation is promising, and the symptoms presented by the overactive bladder decreased after undergoing treatment of parasacral electrostimulation.

4. Conclusion

The clinical trials showed that transcutaneous stimulation in the posterior and parasacral tibial nerve showed positive effects, to decrease the symptoms of detrusor hyperactivity and to work the pelvic floor musculature. There was no standardization in the parameters, so it was perceived the need for other studies with the protocols used in adults with application of parasacral transcutaneous stimulation.

The use of parasacral transcutaneous electrostimulation in adults presents a scarcity of studies. The most recent articles are based on no treatment in children. The adverse effects of parasacral electrostimulation were also not observed in the literature research. Therefore, it is essential to increase research on parasacral electrostimulation and posterior tibial nerve in the treatment of overactive bladder.

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