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Effects of Physiotherapy in the Treatment of Neurogenic Bladder in Patients Infected with Human T-Lymphotropic Virus 1 (HTLV-1)

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Abstract

Objective—To evaluate the efficacy of physiotherapy for urinary manifestations in patients with HTLV-1-associated lower urinary tract dysfunction.

Methods—Open clinical trial with 21 patients attending the physiotherapy clinic of the Hospital Universitário, Bahia, Brazil. Combinations of behavioral therapy, perineal exercises and intravaginal/intra-anal electrical stimulation were used.

Results—The mean age was 54±12 years and 67% were female. After treatment, there was an improvement in symptoms of urinary urgency, frequency, incontinence, nocturia and in the sensation of incomplete emptying ($p<0.001$). There was also a reduction in the overactive bladder symptom score from 10±4 to 6±3 ($p<0.001$) and an increasing in the perineal muscle strength ($p<0.001$). The urodynamic parameters improved, with reduction in the frequency of patients with detrusor hyperactivity from 57.9% to 42.1%; detrusor-sphincter dyssynergia (DSD) from 31.6% to

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5.3%; detrusor hypocontractility from 15.8% to 0% and detrusor areflexia from 10.5% to 0%, with positive repercussions in the quality of life in all patients.

Conclusion—Physiotherapy was effective in cases of HTLV-1-associated neurogenic bladder, reducing symptoms, increasing perineal muscle strength, improving urodynamic parameters and quality of life.

Keywords

HTLV-1; Neurogenic Bladde; Kinesiotherapy; Electrical Stimulation; Behavioral Therapy

Introduction

Human T-lymphotropic virus (HTLV-1) is the etiological agent of HTLV-1-associated myelopathy or tropical spastic paraparesis (HAM/TSP). Although it only occurs in 2% of the infected individuals[1,2], others isolated or assorted syndromes may occur in a large percentage of HTLV-1 infected subjects[3,4]. Urinary complaints are present in virtually all patients with HAM/TSP and occurs in around 30% of HTLV-1 infected individuals[5].

The most common urodynamic finding in HTLV-1-infected patients is detrusor overactivity (DO). Later, detrusor-sphincter dyssynergia (DSD) and/or detrusor areflexia (DA) may develop[6], with the two dysfunctions possibly co-existing in HTLV-1-infected patients[7]. These dysfunctions may cause severe and irreversible consequences to the lower urinary tract[8]. Moreover neurogenic bladder is the principal cause of the urinary symptoms in HTLV-1[9].

Nocturia was reported as the most common complaint, occurring in 84.6% of cases, followed by urgency, increased frequency, urinary incontinence and urge incontinence[10]. The high frequency of these symptoms have been documented in several series of HTLV-1 infected subjects previously considered as carriers, as they do not fulfill the criteria for HAM/TSP[11, 12]. Moreover urinary dysnfunction in HTLV-1 have a great impact in QoL[10].

The most common drugs used for DO are the anticholinergic agents. However, due to the high incidence of side effects, compliance with these drugs tends to be poor[13]. In cases of areflexia catheterization has been the most common approach. Botulinum toxin type A is indicated when patients are refractory to conventional treatment. However, complications such as urinary retention and urinary tract infection limit their use[14].

In this respect, physiotherapy for overactive bladder (OAB) and urinary incontinence has been confirmed as a good option, rendering satisfactory results in patients with urinary symptoms of idiopathic or neurogenic origin through the use of behavioral therapy[15], electrical therapy and kinesiotherapy[16,17,18]. The aim of all these therapeutic resources is to improve urinary symptoms and QoL[19].

The objective of the present study was to evaluate the efficacy of physiotherapy in the treatment of urinary symptoms secondary to neurogenic bladder (NB) in HTLV-1-infected individuals.

Materials and Methods

Study Design

This was an open, uncontrolled clinical trial developed in the physiotherapy outpatient clinic for perineal dysfunction at the Professor Edgard Santos University Hospital, between March 2012 and December 2013. The Institutional review board approved the study protocol and all the participants signed an informed consent form.

Patients

Participants of the study were 21 HTLV-1-infected patients diagnosed by a serologic test (Cambridge Biotech, Worcester, MA) and confirmed by Western Blot (HTLV Blot 2.4, Genelabs, Science Park Drive, Singapore). The sample consisted of patients with NB, with or without associated myelopathy (HAM/TSP). All were over 18 years of age, had lower urinary tract dysfunction diagnosed by urodynamic study and in all cases the condition had proven refractory to anticholinergic drugs. Patients with diabetes mellitus, cerebrovascular accident, multiple sclerosis, Parkinson's disease, wearing a pacemaker, and with a genitourinary infection were excluded from the study.

The sample consisted of patients with probable or definite HAM/TSP according to De Castro Costa 2006 criteria[20]. Patients were selected at random by a simple draw. The draw was made in order to allow everyone who fulfill the inclusion criteria (N=70) have a chance to participate. All the participants were included in a single treatment group. Results following intervention were compared with baseline values.

Definition of Variables and Evaluation's Instruments

The symptoms of OAB were evaluated through the score of the Symptoms of OAB (OABSS), which has a score ranging from 0–14 points, with the sum of individual issues 0–5[10]. The perineal muscles strength was evaluated using the Oxford score/PERFECT assessment scheme[21] the King's Health Questionnaire was used to evaluate quality of life[22]. These instruments were used prior to and following urological physiotherapy.

Treatment

The intervention consisted of combined therapy including: behavioral therapy, with guidance being provided on the need to modify dietary habits and lifestyle, kinesiotherapy, which consisted of specific exercises for the pelvic floor with the objective of improving contractility and the endurance of the muscle fibers and electrical stimulation, with intravaginal or intra-anal probe. This procedure is based on neuromodulation principles to reduce DO and/or improve urinary voiding symptoms associated with perineal exercises to be performed at home. In cases of DO, low-frequency biphasic current of 12 Hz, with a pulse duration of 0.2 milliseconds, was applied continuously for 30 minutes. In the case of detrusor hypocontractility and DA, a medium-frequency current was used (50 Hz, 250 μs), with an intermittent 3-second stimulus followed by 1 second of rest over a total period of 30 minutes. In cases of DSD, the frequency of the current was 100 Hz, 40/70 μs, and the stimulus was applied continuously for 30 minutes. The treatment was carried out twice weekly for a total of 60 minutes, over at least 10 sessions and for a maximum of 40 sessions.

Patients were reevaluated to monitor progress every ten sessions until the end of treatment and periodically every three months thereafter for one year. They were oriented to keep the behavioral guidelines and home perineal exercise.

Evaluation Criteria and Outcome

The clinical improvement was defined as a reduction of at least 50%in urinary complaints at end of therapy compared to the urinary complaints made at baseline. The clinical failure was defined as a reduction of less than 50% in the urinary complaints recorded at baseline, or therapy discontinuation due to adverse reactions to electrical stimulation.

Statistical Analysis

The statistical program R. Version 3.1.3 was used. Data were described by mean ± standard deviation or median and interquartile range (IQ). The McNemar test and Wilcoxon paired t-test were used for paired samples and Mann-Whitney test for independent samples. The Kaplan-Meier survival curve was used to assess the probability of the event over time and compare between the clinical form and gender with Logrank test. The level of significance adopted for this work was 5%.

Results

Of the 25 patients chosen to be included in the study 21 accepted to participate in the clinical trial. The mean age was 54 ± 12 years, most were female 14(67%), non-white 18(86%), had only elementary school education 10(48%) and had a family income of 2 to 3 minimum salaries 8(48%).

Regarding the clinical presentation of HTLV-1, 16 patients (71.4%) had probable HAM/TSP and 5 (28.6%) had definite HAM/TSP. The median of the number of physiotherapy sessions attended by patients with these two clinical forms was 11.5 (IQ=11) and 28 (IQ=16), respectively (P=0.006). A reduction in the frequency of the symptoms was recorded in all cases (Table 1), being more important regarding urgency ($p<0.001$), urge incontinency ($p = 0.001$), frequency and sensation of incomplete emptying and straining to void ($p = 0.004$).

The treatment impact on OABSS is shown in Figure 1. The mean overall OABSS decreased ($P<0.001$) from 10 ± 4 at baseline to 6 ± 3 following the intervention. A contractile gain and an improvement in the quality of the endurance of the muscle fibers of the perineum were found. The Figure 2 shows a muscle strength increasing from a median of 2.0 (Iq=3.0) at baseline to 3 (Iq=2.5) at the end of the treatment ($p<0.001$).

Urodynamic studies were performed in 17 patients after therapy. Some patients had two types of dysfunction before therapy. Changes in urodynamic parameters were found both in the storage phase and in the voiding phase, with a numerical improvement although without statistical significance. Prior to treatment, the most common finding was DO 11(57.9%), followed by DSD 6(31.6%), hypocontractility 3(15.8%) defined as low voiding pressure and low flow and areflexia 2(10.5%). After intervention there were no cases of stress urinary/ incontinency (SUI), detrusor hypocontractility, areflexia or hyposensitivity defined as the

first voiding desire above 150mg or maximum bladder capacity up to 500ml in urodynamic study. Moreover there was a decrease of the DO in 8 cases (42.1%).

There was a reduction in the negative impact of the urinary symptoms on the QoL of all the patients (Table 2). Statistical significance ($p<0.05$) were detected in 6 of the 9 domains measured (impact of incontinence, limitations in daily life, physical limitations, social limitations, emotions, sleep and energy).

During the follow-up 90% of patients remained without failure at day 90, 60% for at least 210 days and 40% of the patients have remained without failure until the end of follow-up. The median for the occurrence of the event was 270 days, 95% (180–365 days). Moreover only 5 (23,8%) need to perform new urologic physiotherapy. There was no association between therapeutic failure with age, gender and HAM/TSP.

Discussion

In the present study we documented that physiotherapy for NB in HTLV-1-infected patients improved clinical and urinary complaints, increased the strength of the perineal muscles and improved patients' quality of life. Some urinary symptoms reduced or disappeared as there was also difference between the number of sessions among patients with the two clinical forms presented, probably due to the degree of neurological impairment and severity of voiding dysfunction in patients with myelopathy installed[3].

The treatment of OAB includes behavioral therapy, consisting in dietary counselling, water control consumption and adopting a micturitional schedule. Behavioral interventions have proven to represent an important and effective tool for controlling micturition[23].

Kinesiotherapy is used as a form of pelvic floor muscle training for the treatment of urinary incontinence. The exercises and manual techniques improve perineal perception in voiding dysfunctions, reducing the incidence of urgency, frequency, nocturia and urinary incontinence[24]. In this study, an increase in muscle strength was found in the majority of the patients, with a consequent reduction in urinary loss corroborating with other [25].

Although electrical stimulation is a traditional practice, up to the present moment there is no consensus on the ideal electrical parameters that should be used. In the present study we used electrical stimulation with a low-frequency current and high pulse width, with a greater time of stimulation for patients with DO. Pannek et al[26] used lower parameters and obtained a decrease in urinary symptoms in 18 (32.7%) of 52 patients with neurogenic DO. The medium-frequency currents were used for patients with acontractile bladder, hypocontractile bladder and DSD. Primus[27] used intraurethral electrical stimulation for acontractile and hypocontractile bladder and found detrusor contraction in 39% of the patients, with a 75% improvement in bladder sensation and a reduction in the mean post miccional residual volume. Despite the fact that studies differ with respect to the electrical parameters used, improvement in symptoms is usually achieved. Our data suggests that electrical stimulation represents a good alternative for bladder dysfunction associated with HTLV-1 infection. It is simple to perform, safe, cost-effective and with little or no associated complications.

The changes found in the urodynamic studies were limited, but changes in bladder function were significant. An improvement in urgency, frequency, urge incontinency and feeling of incomplete emptying was documented resulting in a decreasing in the OABSS. The treatment also resulted in the improvement of the perineal muscle strength. The results were similar to the one found in patients with multiple sclerosis with refractory NB to drug treatment[28].

The efficacy of the therapy lasted long in most patients. Eight patients remained without urinary complaints in the course of a year. However, the time interval for the reappearance of any symptom was approximately 6 months and the clinical form did not interfere with the decrease in survival. In a previous study in patients with OAB of other causes the improvement in urinary symptoms and QoL persisted for three years[29].

Urinary symptoms compromise QoL and in patients with HTLV-1, and the negative impact on QoL may be as much as four times greater[10] Physiotherapy positively affected the QoL of these patients, principally with respect to the effect of incontinence on their lives, limitations in their daily life, physical and social limitations, emotions, sleep and energy. Although no significant differences were found for the domains of general health, personal relationships or degrees of severity, there was a reduction in the impact of the symptoms in these domains. Personal relationships may be an aspect associated with the progressive worsening of the disease. It deals with the family context, the individual's sexual life, hygiene and the patient's way of confronting the issue. Moreover it tends to contribute towards isolation and depression, and affects self-perception of their state of health, their disease and their life[30]. Therefore, therapeutic measures for urinary symptoms may reduce the impact of these symptoms on patients' QoL.

In assessing the follow-up 8 (40%) of the patients remained asymptomatic for a period of one year. The return of some urinary symptoms occurred in 13 (60%) in the period of 7 months and 5 (23.85) of these had to return the physical therapy treatment. However, the return of these symptoms did not impact negatively on the QoL thereof. Treatment was able to improve and maintain the QoL of patients after urological physiotherapy for a relevant time.

The results observed here may be promising in the treatment of NB associated with HTLV-1. Moreover the absence of complications or adverse events is a potential benefits for the eletrophysiotherapy.

The limitations of the present study refer to its sample size and to the lack of a control group. Nevertheless, since in all cases the condition had proven refractory to other types of interventions, delaying treatment could have had undesirable consequences and would have ethical implications. Moreover, this study is valid due to its originality and to its relevance by aiming to introduce new perspectives for the treatment of NB in HTLV-1 infected subjects. Additionally it extends previous observation that physiotherapy for lower of urinary tract dysfunction is safe, cost-effective, simple to perform, and well accepted by the patients.

Conclusion

Physiotherapy for urinary incontinence was effective in the treatment of NB in HTLV-1-infected individuals, reducing urinary complaints and increasing the strength of the perineal muscles, which reflected positively on the patients' quality of life. However, long-term follow-up and experience are required to determine the details of the techniques used, as well as their periodicity, limits and the adequacy of this indication for the treatment of NB in HTLV-1-infected individuals.

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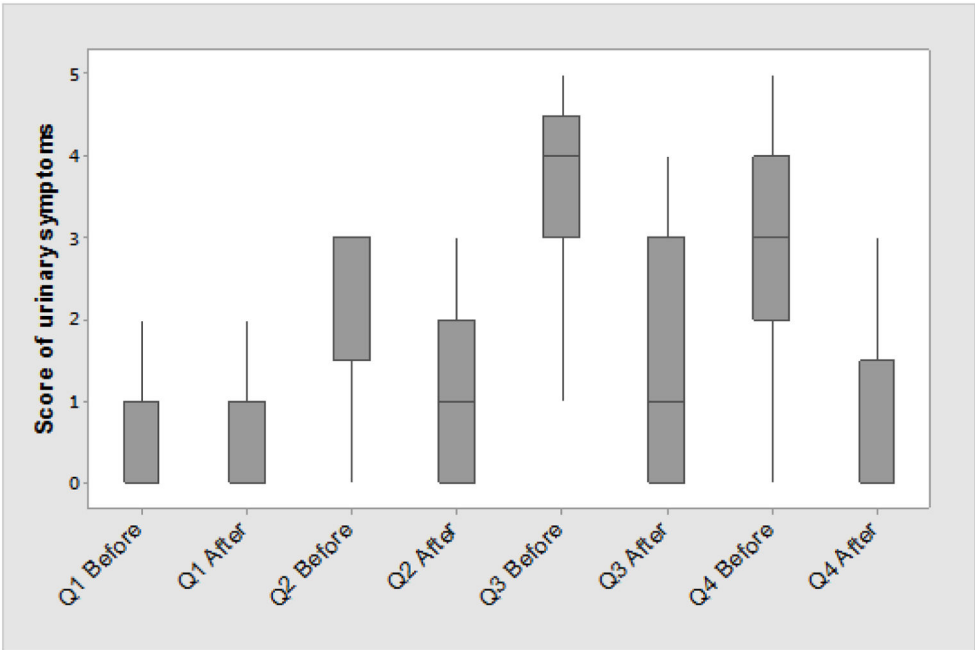

Figure 1.

Overactive bladder symptoms score questionnaire (OABSS) before and after urological physical therapy in HTLV-1 patients. Salvador, Bahia, Brazil 2014.

Q1 Daily frequency P 0,002; Q2 Nocturia P< 0,001; Q3 Urgency P< 0,001; Q4 Incontinence P< 0,001.

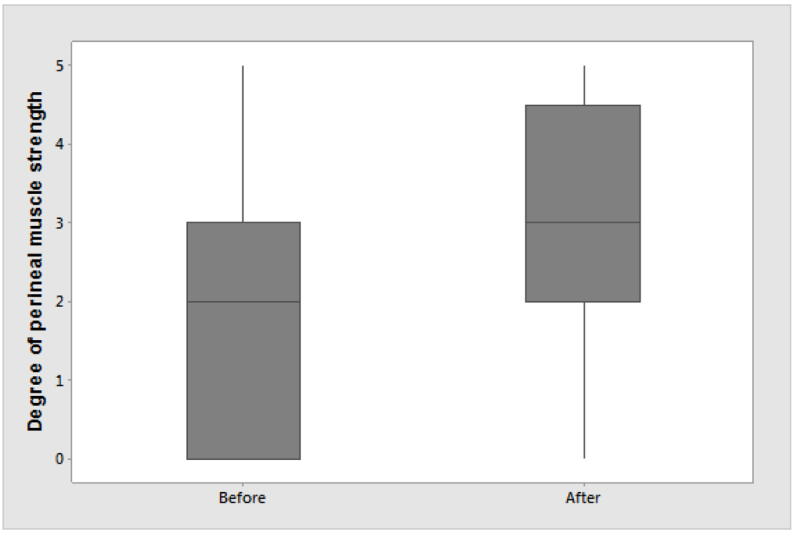

Figure 2.

Evaluation of the perineal muscle strength before and after urological physiotherapy in HTLV-1 patients. Salvador, Bahia, Brazil 2014.

Perineal muscle strength was measured according the Oxford score / Perfect assessment Scheme

Table 1

Distribution of frequency of urinary symptoms before and after urological physical therapy in 21 HTLV-1 infected subjects.

	Before Therapy		After Therapy		
Variables	**N**	**%**	**N**	**%**	**P-value***
Urgency					0,000
Present	21	100	9	42,9	
Frequency					0,004
Present	12	57,1	3	14,3	
Urge-incontinence					0,001
Present	15	71,4	4	19	
Nocturia*					0,070
Present	16	76,2	10	47,6	
Feeling of incomplete emptying					0,004
Present	15	71,4	6	28,6	

* Nocturia: the act of waking up one or more times during the night to urinate.

McNemar test

Table 2

Quality of life characteristics before and after urological physical therapy for HTLV-1 patients. Salvador, Bahia, Brazil 2014.

Variables (n=21)	Before	After	P- value*
	Median (Iq)		
General perception of health	50.00(50)	50.00(25)	0.148
Impact on incontinence	67.00(33)	01.00(50)	**<0.001**
Limitation of daly life	50.00(50)	00.00(50)	**0.001**
Physical limitation	33.00(51)	00.00(59)	**0.016**
Social limitation	33.00(72)	00.00(22)	**< 0.001**
Personal relationships	00.00(67)	00.00(33)	0.082
Emotions	44.00(62)	00.00(44)	**0.002**
Sleep and disposition	33.00(50)	17.00(42)	**0.005**
Gravity measures	33.00(43)	13.00(44)	0.144

Wilcoxon signed ranks test