

Muscle contraction of the pelvic floor and quality of life of women with stress urinary incontinence who underwent kinesitherapy

DOI number 10.2478/v10109-010-0052-5

Leila Beuttenmüller^{1,2}, Samária Ali Cader^{2,3}, Raimunda Hermelinda Maia Macena⁴, Nazete dos Santos Araujo², Érica Feio Caneiro Nunes², Estélio Henrique Martin Dantas^{3,5}

¹ Stricto Sensu Post-graduation Program in Human Kinetics Science, of Castelo Branco University, Rio de Janeiro, Brazil

² Laboratory of Human Kinetics Science – LABIMH – UCB/RJ/Brazil

³ Nuestra Señora del Asunción Catholic University / REMH

⁴ Faculdade Integrada of Ceará – FIC Estácio/Ceará/Brazil

⁵ Research Grant of National Council of Research Stricto Sensu Post-graduation Program in Human Kinetics Science of Castelo Branco University, Rio de Janeiro, Brazil

Abstract:

Introduction: the World Health Organization recommends physical therapy in patients with mild to moderate Urinary Incontinence (UI) as the first line of treatment. Aim: Evaluate the effect of electrical stimulation on muscle contraction of the pelvic floor and quality of life of women with stress UI (SUI). Methods: experimental study with 75 female patients randomly divided into: G1: electrical stimulation therapy with kinesitherapy; G2: kinesitherapy; G3: control group. Parameters evaluated: anthropometric measurements, physical examination of the pelvic floor (AP), pelvic floor muscles (AFA) and the degree of contraction of the AP (CAP) by the activity of the muscles [Type I (TI) and Type II (TII)] and Quality of life (QOL). Intervention consisted of 12 sessions, two sessions per week for six weeks. Descriptive statistics were used and the Student's t test or Wilcoxon paired test for the intra-group analysis. For the inter-group analyses, we used the Kruskal Wallis followed by the Mann-Whitney (AFA and QOL) and two-way ANOVA followed by Scheffe post hoc test (CAP). The $p < 0.05$ was adopted for statistical significance. Results: there was a significant difference in: AFA TI and AFA TII (G1 x G3 and G2 x G3); CAP TI (G2 x G3). There was a significant reduction in all domains of QOL in G1 and G2 except for DOM 6 in G2. The G3 group did not display any significant results. Conclusions: both physical therapy treatments (G1 and G2) were effective in the improvement in pelvic floor muscular functioning and in quality of life.

Key words: urinary Incontinence, pelvic floor, physical therapy modalities, electrostimulation, quality of life.

Introduction

According to the International Continence Society, Urinary Incontinence (UI) is the uncontrollable loss of urine at any time that is socially or physically unacceptable [1]. Considered the main pathology of pelvic floor disorders, UI also causes social and hygienic discomfort, sometimes leading to the exclusion of daily life activities due to the risk of wet clothes or the smell of urine.

UI primarily affects women, with prevalence ranging from 25 to 45% [2], especially among middle aged women; its development often takes place at this age due to decreased hormone levels. Studies conducted between 2000 and 2005 revealed that rates for middle-aged women with UI vary from 27 to 64% of IU and demonstrated a significant association between UI and the pre and post-menopausal period [3-5].

Urinary incontinence in women may be caused by two major physiological conditions that are not mutually exclusive and are represented by bladder dysfunction and changes of the urethral sphincter or the intrinsic elements of pelvic support. The disorders include bladder destructor over-activity and low bladder compliance. The integral theory

of continence was designed with the goal of explaining in an integrated manner the pathogenesis of urinary incontinence and its associated symptoms. Another hypothesis is that changes in the tension on the vagina, derived from urogenital prolapse, can also determine the premature activation of the micturition reflex, which would cause involuntary contractions of the detractor [6]. Other authors have reported that laxity of the vaginal ligaments may be associated with a deficiency of collagen, defects in the sub-urethral vagina, excessive tension in the bladder neck, loss of pubouretrais or utero-sacral ligaments, trauma of the external anal sphincter and the extremity of the elevator muscle of the anus [7-9].

That condition restricts social activities and greatly diminishes quality of life. Possible consequences include unemployment, isolation and emotional stress [10]. Many aspects of the life of a person who suffers from UI are impaired, including psychological well being, social interactions and activities, and sexual and interpersonal relationships [11]. Therefore, quality of life assessments have become increasingly important for the assessment of urinary incontinence among women [12].

The treatments offered for UI consist of surgical procedures and pharmacological procedures together with

physical therapy. However, since 1999, the World Health Organization (WHO) has recommended physical therapy for patients with mild to moderate UI as the first line treatment; after three months of physical therapy intervention, the need for alternative surgical or pharmacological treatment should be evaluated [13].

Forms of nonsurgical treatment of UI have been studied for a long time. Thus, physical therapy has become an important factor in contributing to improvement or cures for the spontaneous loss of urine. Among the resources used by physical therapy are exercise alone (exercises for muscle contraction), vaginal cones, electrical stimulation, biofeedback and behavioural therapy [14].

Based on the exposed below, the aim of the present study was to evaluate the effect of pelvic electrical stimulation on the muscle contraction of the pelvic floor and the quality of life of women with stress UI.

Material and methods

This research was considered experimental in nature. The subjects were 75 female patients that had been diagnosed with UI between August 2008 and August 2009 at the Design Social Responsibility of Faculdade Integrada do Ceará (FIC-Estácio), called the Rehabilitation Unit of the Pelvic Floor Disorders (UREDAPE) in Fortaleza-Ceará. The patients were randomly divided into three groups: G1 (n = 25): group receiving electrical stimulation therapy with kinesitherapy; G2 (n = 25): group receiving kinesitherapy; and G3 (n = 25): the control group, which consisted of women with UI who were not subjected to any physical therapy at that time.

This research was performed in accordance with the Ethical Guidelines for Biomedical Research Involving Human Beings as stated in the principles in the Declaration of Helsinki [15]. The research project was also approved by the Ethics Committee Faculdade Integrada do Ceará 213/08.

In order to characterise and verify the homogeneity of the sample, anthropometric measurements of body mass and height and body mass index (BMI) using, respectively, a digital scale with a resolution of 100 g [Filizola® model PL150 Personal Line, Brazil], a stadiometre professional SANNY® (Brazil) and a skin fold calliper, Lange® (USA), with a resolution of 1 mm and a constant pressure of 10 g/mm². All collection points obeyed the requirements of the International Standards for Anthropometric Assessment – ISAK [16].

We also carried out a medical history to obtain the following data: age, history of depression, physical activity or inactivity, menstrual cycle, pelvic pain, changes in the abdomen, gynaecological history, obstetric and surgical patients, destructor instability, and incontinence associated with constipation and symptoms of loss of urine.

Evaluation of the Pelvic Floor (AP)

Next, we performed a physical examination of the pelvic floor (AP) in order to identify the conditions of the skin tone, anatomical defects, the vulva-anus distance, scars, adhesions, fibrosis, wounds, haemorrhoids, and presence of prolapse prior to the palpation [17,18]. The examination of the vagina, touch and palpation intra-operatively, followed the Hensch protocol [19].

To evaluate the pelvic floor muscles (AFA), the degree of contraction of the AP (CAP) was determined through the perineometre pressure device (Peritron™ brand), which has a device that measures the activity of the muscles [fast twitch, Type I (TI), and slow twitch, Type II (TII)] in cmH₂O. The patient remained in the gynaecological position with the abdomen, pelvis and legs exposed. We used an Oxford table [18] divided into five stages: 0 - no contraction of the

perineal muscles; 1 – no contraction; 2 – presence of low intensity contraction; 3 – moderate contraction with a slight elevation of the cranial vaginal wall; 4 – satisfactory contraction that squeezes the examiner's finger with elevation of the posterior vaginal wall; 5 – firm compression of the examiner's fingers to move toward the pubic symphysis.

Evaluation of Quality of Life (QOL)

Quality of life was assessed using the King's Health Questionnaire (KHQ), which is composed of 30 questions distributed in nine areas with scores varying from 0 to 100 for each domain.

Domain 1: General Health

Domain 2: Impact of incontinence

Domain 3: Limitations of daily activities

Domain 4: Physical limitations

Domain 5: Social

Domain 6: Personal relationships

Domain 7: Emotions

Domain 8: Sleep / provision

Domain 9: Measures of severity

This assessment is inversely proportional: that is, a higher score obtained for each area indicates worse quality of life in this area. This questionnaire addressed aspects of the general perception of health, the impact of incontinence, the limitations in performance of tasks, physical limitations, social limitations, personal relationships, emotions, sleep/energy and severity measures [20]. The KHQ is complemented by an independent scale that assesses both the presence and the intensity of urinary symptoms: increased urinary frequency (SINT_1), nocturia (SINT_2), urgency (SINT_3), bladder hyperreflexia (SINT_4), stress urinary incontinence (SINT_5) nocturnal enuresis (SINT_6), sexual incontinence (SINT_7), urinary infections (SINT_8) and bladder pain (SINT_9).

Importantly, the KHQ is a specific QOL questionnaire for urinary incontinence that has been validated, translated and adapted to the Portuguese language and is available for use in clinical research in Brazil [21].

Physical Therapy Treatment

The physical therapy intervention consisted of a protocol of 12 sessions of physical therapy for the AP consisting of two sessions per week for 6 (six) weeks, except during menstrual periods or due to other complications [20].

Kinesiotherapy was accomplished through standing or sitting exercises using a Swiss ball of varying size, according to the height and weight of the patient [22]. Each session lasted 20 min and was performed in groups of up to 4 people under the supervision and verbal command of a therapist. Proprioceptive exercises such as hopping on the ball, moves to raise the pelvis (ante version-retroversion, lateralisation) and circumduction were used. Additionally, exercises were used to contract the pelvic floor to the original position, working the two fibre types I and II by performing contract-relax perineal exercises and hold-relax training, respectively, up to 6 s [23].

Functional electrical stimulation was performed with a Uro, Quark® Medical Products appliance with an intracavitary probe with two metal rings, which was lubricated with sterile gel introduced into the vagina of the patient who remained in the gynaecological position. High frequencies (50 Hz) are indicated for IU to strengthen the AP muscle [18]. The medium voltage or zero-phase alternating current with a frequency of 50 Hz and a pulse width from 0.2 to 0.5 ms was used. The rest time corresponds to at least twice the time of passage of the current [17]. We used 20 min to strengthen the perinea [24], with a maximum tolerated intensity determined for each individual. The contraction and relaxation of the AP were also directed during each period of electrical stimulation.

After 12 sessions, all patients underwent a new evaluation with the same procedures and instruments described above.

We used descriptive statistics to evaluate means, standard errors, medians, standard deviations, minimums, maximums and delta percentages ($\Delta\%$). The normality of the sample was assessed by the Shapiro-Wilk test, and the homogeneity of variance by the Levene test. To analyze response variables, we used the intra-group analysis, the Student-t test or the Wilcoxon paired test where appropriate (homogeneous or heterogeneous distribution of the data, respectively). For the inter-groups analysis, we used the nonparametric Kruskal Wallis followed by multiple comparisons using the Mann-Whitney (AFA and QOL) or parametric test of two-way ANOVA followed by post hoc Scheffe test (CAP). $P < 0.05$ was employed

to determine statistical significance. The statistical evaluation was performed using Excel and the Statistics Package for the Social Science (SPSS) version 14.0.

Results

Table 1 presents descriptive data for the three study groups according to age and BMI.

The average age of the study groups can be categorized as middle-aged, and the majority of women in this study had a BMI within the normal range established by the World Health Organization [25].

The following table presents the descriptive values of the functional strength of the pelvic floor muscles (AFA) in the three groups evaluated in the pre and post tests.

A non-homogeneous distribution of the data was observed by analysis of the SW of the pre-test results. Figure 1 shows the AFA T1, AFA TII, CAP rest, CAP T1, and CAP TII peer groups.

A significant difference in AFA TI ($\Delta\% = 11.99$, $p = 0.000$) and AFA TII ($\Delta\% = 11.60$, $p = 0.000$) in G1 compared to G3 was observed. G2 also showed significant difference in AFA TI ($\Delta\% = 4.75$, $p = 0.021$), AFA TII ($\Delta\% = 2.93$, $p = 0.002$) and CAP IT ($\Delta\% = 29.94$, $p = 0.012$) when compared to G3.

Table 3 presents data describing the severity of urinary symptoms presented for each group: increased urinary

Table 1. Anthropometric descriptive data

	Variables	Mean	Standard deviation	Coefficient variation	Minimum	Maximum	p value (SW)
G1	Age	52.17	3.76	0.07	47.00	56.00	0.01
	BMI	24.92	3.64	0.15	19.30	29.60	0.01
G2	Age	49.96	5.26	0.11	43.00	61.00	0.25
	BMI	23.40	3.52	0.15	18.70	29.60	0.04
G3	Age	44.82	4.88	0.11	29.00	51.00	0.01
	BMI	24.36	2.16	0.09	19.60	27.50	0.09

Legend: SW – Shapiro Wilk; age (years old)

Table 2. Functional strength of the pelvic floor muscles (AFA)

	Test	G1		G2		G3	
		mean ± standard deviation	p-value (SW)	mean ± standard deviation	p-value (SW)	mean ± standard deviation	p-value (SW)
AFA TI	pre	2.88 ± 0.74	0.000*	2.80 ± 0.76	0.000*	2.82 ± 0.73	0.001*
AFA TII		2.67 ± 0.64	0.000*	2.68 ± 0.63	0.000*	2.64 ± 0.58	0.000*
CAP rest	pre	29.38 ± 7.12	0.017*	29.32 ± 5.86	0.2150	28.95 ± 5.96	0.466
CAP TI		17.44 ± 4.84	0.250	17.50 ± 3.67	0.9150	17.39 ± 5.07	0.136
CAP TII		28.38 ± 11.10	0.066	28.52 ± 9.70	0.0400*	28.05 ± 9.54	0.170
AFA TI	post	3.58 ± 0.83	-	3.84 ± 0.80	-	2.95 ± 0.90	-
AFA TII		3.63 ± 0.71	-	3.80 ± 0.65	-	2.86 ± 0.77	-
CAP rest	post	30.79 ± 7.44	-	32.28 ± 7.33	-	28.73 ± 7.60	-
CAP TI		21.77 ± 6.16	-	22.74 ± 5.65	-	17.70 ± 5.86	-
CAP TII		31.38 ± 11.64	-	32.72 ± 10.34	-	28.09 ± 9.89	-

Legend: SW – Shapiro Wilk; *significant difference; AFA – functional strength of pelvic diaphragm; TI – fibres type I; TII - fibres type II; CAP – contraction grade of pelvic floor.

frequency (SINT_1), nocturia (SINT_2), urgency (SINT_3), bladder hyperreflexia (SINT_4), stress urinary incontinence (SINT_5), nocturnal (SINT_6), sexual incontinence (SINT_7), urinary infections (SINT_8) and bladder pain (SINT_9).

There was a significant difference ($p < 0.05$) in the post-test results for all symptoms in the G1 group, while G2 and G3 showed significant differences ($p < 0.05$) in symptoms 1 and 6, which relate to increased urinary frequency and nocturnal enuresis. The G2 group also showed a significant difference ($p < 0.05$) in symptom 5, which is related to SUI, whereas group G3 showed a significant difference ($p < 0.05$) in symptom 3, which is related to urgency. The following table presents data on the quality of life of different areas in the pre and post tests.

There was a significant reduction ($p < 0.05$) in all domains of QOL in G1, while G2 showed a significant reduction ($p < 0.05$) in all domains of QOL except for in DOM 6, which is associated with social relations. The G3 group did not display any significant difference ($p < 0.05$) in any field. These data demonstrate that physical therapy (electrotherapy and exercises) positively affects the QOL of patients.

Discussion

The improvement in functional strength of the pelvic floor muscles (AFA) and both the fast twitch and slow twitch fibres in G1 and G2 denotes the efficiency of physical

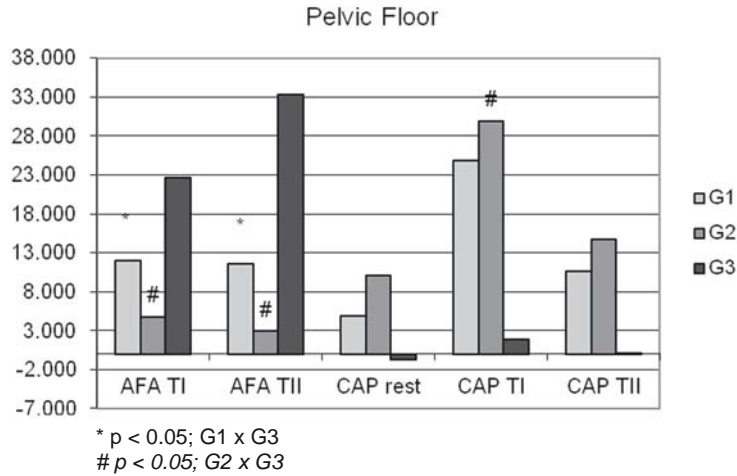


Fig. 1. Inter-group differences

Table 3. Urinary symptoms

	Tests	Mean	SD	Mean	SD	Mean	SD
		G1		G2		G3	
SINT_1	pre	2.21	0.72	2.04	0.84	1.64	0.49
	post	1.58*	0.72	0.84*	0.85	1.36*	0.58
SINT_2	pre	2.00	0.72	0.84	0.62	1.23	0.69
	post	0.88*	0.68	0.68	0.80	1.14	0.56
SINT_3	pre	1.79	0.98	1.16	0.99	1.55	0.60
	post	1.00*	0.88	1.00	1.04	1.14*	0.71
SINT_4	pre	2.33	1.13	1.16	0.99	1.18	0.59
	post	0.88*	0.80	0.88	0.88	1.23	0.53
SINT_5	pre	1.88	1.03	1.76	0.88	1.91	0.92
	post	1.08*	0.83	1.00*	0.91	1.95	0.90
SINT_6	pre	0.88	1.12	0.68	0.85	0.00	0.00
	post	0.00*	0.00	0.24*	0.52	0.36*	0.58
SINT_7	pre	0.79	0.88	0.36	0.70	0.55	0.67
	post	0.13*	0.34	0.32	0.63	0.41	0.59
SINT_8	pre	1.58	0.97	0.24	0.52	0.23	0.43
	post	0.46*	0.78	0.16	0.37	0.18	0.39
SINT_9	pre	0.67	0.92	0.32	0.56	0.23	0.53
	post	0.33*	0.64	0.24	0.72	0.09	0.29

Legend: SINT – symptoms; SD – standard deviation; * $p < 0.05$ significant intra-group difference.

therapy with electrotherapy and exercises for the treatment of stress UI.

These data corroborate the study of Dumoulin et al. [26], who tested the ability of a biofeedback-assisted pelvic-floor muscle exercise (PFME) programme to affect symptoms of Urinary Incontinence (UI) in premenopausal women and evaluated a training programme in twenty-six women with UI that were treated with PFME with surface electromyography (sEMG) assisted biofeedback. All participants were of reproductive age and were treated individually for 12 sessions. The results showed that the frequency of urine loss, the occurrence of nocturia, and the number of pads required decreased significantly after the intervention. An objective cure was found in 61.5% of women. There was a significant improvement

in the quality of life, in pelvic-floor muscle strength, and in the sEMG amplitudes of all contractions throughout the intervention.

A systematic review investigated the efficacy and effectiveness of pelvic floor muscle training (PFMT) performed alone or together with adjunctive therapies (e.g., biofeedback, electrical stimulation, vaginal cones) for the treatment of female SUI. All major electronic sources of relevant information were systematically searched to identify peer-reviewed English language abstracts or papers published between 1995 and 2005. The authors concluded that there is strong evidence for the efficacy of physical therapy for the treatment for SUI in women; however, further high quality studies are needed to evaluate the optimal treatment programmes and training protocols

Table 4. Evaluation of Quality of Life

	test	G1			G2			G3		
		mean ± SD	Δ%	p value (SW)	mean ± SD	Δ%	p value (SW)	mean ± SD	Δ%	p value (SW)
DOM1	pre	47.92 ± 17.93	-30.43	0.001*	40.33± 17.46	-27.27	0.015*	27.27± 13.16	4.17	0.655
	post	33.33 ± 12.04			29.33 ± 15.61			28.41± 15.99		
DOM2	pre	66.64 ± 32.61	-39.61	0.001*	48.97 ± 26.82	-47.64	0.0001*	53.77± 24.09	-0.71	0.715
	post	40.25 ± 1.04			25.64± 23.41			53.39± 22.81		
DOM3	pre	29.83 ± 20.83	-62.83	0.000*	41.98 ± 34.06	-58.74	0.0001*	31.79± 22.93	-2.39	1.000
	post	11.09 ± 15.27			17.32 ± 20.94			31.03± 18.75		
DOM4	pre	25.67 ± 21.96	-51.41	0.009*	29.97 ± 25.00	-28.90	0.019*	31.79± 27.6	-2.37	0.785
	post	12.47 ± 17.18			21.31 ± 19.54			31.03± 25.85		
DOM5	pre	9.48 ± 12.19	-51.21	0.016*	13.21±22.19	116.87	0.021*	20.94± 22.92	-3.62	0.581
	post	4.63 ± 5.59			28.64 ± 30.90			20.18± 23.46		
DOM6	pre	24.30 ± 26.45	-31.45	0.009*	12.60± 16.57	-32.55	0.2680	26.50± 30.71	-0.98	0.680
	post	16.65 ± 26.01			8.50 ± 17.74			26.25± 30.82		
DOM7	pre	37.46 ± 34.61	-32.73	0.026*	34.20 ± 31.40	-30.85	0.008*	28.50± 25.78	0.89	0.916
	post	25.20 ± 23.72			23.65 ± 24.48			28.75± 24.04		
DOM8	pre	30.38 ± 26.62	-56.64	0.001*	30.34 ± 27.64	-36.36	0.015*	24.71± 15.13	0.97	0.750
	post	13.18 ± 12.59			19.31 ± 23.89			24.95± 13.38		
DOM9	pre	36.93 ± 21.80	-60.94	0.000*	49.82 ± 24.87	-42.77	0.000*	35.4 ± 22.73	1.63	1.000
	post	14.43 ± 14.54			28.52 ± 24.07			35.97 ± 23.55		

Legend: SD – Standard Deviation; SW – Shapiro Wilk; * significant difference

in subgroups of women and their effectiveness in clinical practice [27].

The benefits of physical therapy demonstrated in the present study corroborate another study that aimed to compare the results of treating female stress urinary incontinence with pelvic floor muscle exercises with or without physiotherapist supervision. Forty-four women were randomised into two groups for treatment for stress urinary incontinence with pelvic floor exercises for three consecutive months: one with and the other without physiotherapist supervision. In the subjective evaluation, only 23.8% of the control group patients were satisfied with their treatment. In the supervised group, 66.8% of the patients did not want any other treatment. The authors concluded that supervised pelvic floor muscle exercises present better results in objective and subjective evaluations than do unsupervised exercise [28]. Hay-Smith et al. [29] also concluded that pelvic floor muscle training is better than no treatment or placebo treatments.

The G1 and G2 groups showed a significant reduction in the quality of life (QOL) score, denoting an improvement in quality of life in groups submitted for physical therapy treatment. The same effect was obtained in a study comparing quality of life (QOL) before and after physical therapy in 26 women with clinical symptoms that were predominantly SUI. That study demonstrated a decrease in urinary symptoms, including urinary frequency, nocturia, urinary urgency and urinary incontinence, and a significant improvement in the KHQ domain scores: health perception (49.0 ± 24.0 versus 26.9 ± 15.7 , $p = 0.0015$), incontinence impact (78.2 ± 28.2 versus 32.1 ± 30.5 , $p = 0.001$), activity limitations (75.0 ± 28.2 versus 13.5 ± 22.6 , $p < 0.001$), physical limitations (72.4 ± 29.4 versus 15.4 ± 24.5 , $p < 0.001$), social limitations (38.3 ± 28.6 versus 6.4 ± 14.5 , $p < 0.001$), emotional condition (59.0 ± 33.8 versus 14.1 ± 24.7 , $p = 0.0001$), sleep / energy (34.0 ± 23.8 versus 6.4 ± 16.4 , $p = 0.001$) and severity measures (66.9 ± 19.6 versus 22.3 ± 24.2 , $p < 0.001$), except for personal relationships (60.5 ± 33.9 versus 41.7 ± 16.7 , $p = 0.0679$) [30].

A cross-sectional study to determine the prevalence and risk factors of urinary incontinence (UI) in 625 women aged 20 yrs or older and to assess its influence on quality of life (QOL) using the Urinary Incontinence Quality of Life Instrument showed that the impairment in QOL was related

with the type of UI, frequency of UI episodes, amount of leakage and UI during sexual intercourse and concluded that the QOL in women was either mildly or moderately affected by UI [31].

The impact of urinary incontinence on quality of life is significantly higher than its impact on sexual function. An impairment of sexual life by urinary incontinence was stated by 25.1% of women and 30.5% of men, respectively. Although only 65.7% of women and 58.3% men with urinary incontinence reported an impairment of quality of life, these data highlight the high prevalence and socioeconomic implications of this disorder [32].

Conclusion

Due to the presented improvement in pelvic floor muscular functioning and in quality of life, we can conclude that both physical therapy treatments (electrostimulation and electrostimulation with kinesitherapy) were effective in the treatment of women with UI.

Ethical's approval

This research was performed in accordance with the Ethical Guidelines for Biomedical Research Involving Human Beings, as stated in the principles in the Declaration of Helsinki [15]. The research project was also approved by the Ethics Committee Faculdade Integrada do Ceará 213/08.

Sponsors' role

We have read the submitted manuscript, which includes our names as authors, and vouch for its accuracy. We certify that we have sufficiently participated in the conception and design of this work, the analysis of the data (where applicable), and the writing of the manuscript, and we take public responsibility for its content. We believe the manuscript represents honest and valid work. We have reviewed the final version of the submitted manuscript and approve it for publication. No funds were received in support of this study. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this manuscript.

References

- [1] Grosse D., Sengler J. *Reeducação perineal. Conceção, realização e transcrição em prática liberal e hospitalar*. São Paulo: Manole, 2002.
- [2] Hay-Smith E., Ryan K., Dean S. *The silent, private exercise: experiences of pelvic floor muscle training in a sample of women with stress urinary incontinence*. Physiotherapy. 2007, 93, 1, 53-61.
- [3] Borba A., Lelis M., Brêtas A. *The meaning of urinary incontinence and be incontinent-women opinion*, Texto & Contexto-Enfermagem. 2008,17, 525-527.
- [4] Silva A., Santos V. *Prevalence of urinary incontinence in hospitalized patients*. Revista da Escola de Enfermagem da USP. 2005, 39, 36-45.
- [5] Sampsel C., Palmer M., Boyington A., O'Dell K., Wooldridge L. *Prevention of urinary incontinence in adults: population-based strategies*. Nursing Research. 2004, 53, 6S, S61.
- [6] Barbosa R., Palma P., Ricetto C.. *Correlação entre distopia urogenital e bexiga hiperativa em mulheres com incontinência urinária de esforço*. 2005.
- [7] Prudente R. *Prolapso Genital*. Guia Prático de Uroginecologia.
- [8] Palma P., Ricetto C. *Incontinência urinária na mulher*. Barata H.S.; Carvalho G.F. *Urologia: princípios e prática Porto Alegre*: Artes Médicas. 1999, 209-235.
- [9] Palma P. *Uroginecologia ilustrada*: Sao Paulo, Roca, 2005.
- [10] Kinn A, Zaar A. *Quality of life and urinary incontinence pad use in women*. International Urogynecology Journal. 1998, 9, 2, 83-87.
- [11] Coyne K., Zhou Z., Thompson C., Versi E. *The impact on health-related quality of life of stress, urge and mixed urinary incontinence*. BJU international. 2003, 92, 7, 731-735.
- [12] Kelleher C. *Quality of life and urinary incontinence*. Best Practice & Research Clinical Obstetrics & Gynaecology. 2000,14, 2, 363-379.
- [13] Organization WH. *International health regulations*. www.who.int, 2005

- [14] Guedes J., Sebben V. *Rev. Bras. de Ciên. do Envelh. Hum.*, V. 3 N. 1-Jan.-Jun./2006. *Rev Bras de Ciên do Envelh Hum.* 2006, 3 (1-JAN).
- [15] WMA. World Medical Association. *Declaration of Helsinki 2008 – Principles for Medical Research Involving Human Subjects 59th WMA General Assembly*, Seoul. 2008.
- [16] Marfell-Jones M., Olds T., Stewart A., Carter L. *International standards for anthropometric assessment*. ISAK, Potchefstroom. 2006.
- [17] Grosse D., Sengler J. *As técnicas da reeducação perineal. A eletroestimulação*. Grosse D., Sengler J. *Reeducação perineal São Paulo*: Manole. 2002, 82-95.
- [18] Moreno A. *Fisioterapia em uroginecologia*. São Paulo: Manole, 2004.
- [19] Henschler U. *Fisioterapia em Ginecologia*. São Paulo: Ed Santos. 2007.
- [20] Rett MS J.A., Hermann V., Gurgel MSC, Morais S.S. *Qualidade de vida em mulheres após tratamento da incontinência urinária de esforço com fisioterapia*. *Rev Bras Gineco Obstet.* 2007, 29, 3, 5-9.
- [21] Tamanini JDA C.A.L., Botega N.J., Rodrigues Netto Jr, N. *Validação do "King's Health Questionnaire" para o português em mulheres com incontinência urinária*. *Rev Saúde Pública.* 2003, 37, 2, 203-11.
- [22] Endacott R. *Clinical research 4: qualitative data collection and analysis*. International Emergency Nursing. 2008, 16, 1, 48-52.
- [23] Matheus LM C.F., Mesquita RA, Oliveira J. *Influence of perineal exercises and vaginal cones in association with corrective postural exercises, on female urinary incontinence treatment*. *Revista Brasileira de Fisioterapia.* 2006, 10, 387-392.
- [24] Rett MS J.A., Hermann V., Gurgel MSC, Morais S.S. *Management of stress urinary incontinence with surface electromyography-assisted biofeedback in women of reproductive age*. *Physical Therapy.* 2007, 87, 2, 136.
- [25] WHO. *Physical Status: The Use and Interpretation of Anthropometry*, Report of a WHO Expert Committee, WHO Technical Report Series. Geneve. 2004.
- [26] Dumoulin C., Hay-Smith J. *Pelvic floor muscle training versus no treatment for urinary incontinence in women. A Cochrane systematic review*. *European journal of physical and rehabilitation medicine.* 2008, 44, 1, 47.
- [27] Neumann P., Grimmer K., Deenadayalan Y. *Pelvic floor muscle training and adjunctive therapies for the treatment of stress urinary incontinence in women: A systematic review*. *BMC Women's Health.* 2006, 6, 1, 11.
- [28] Zanetti MC, R.A., Rotta A.L., Santos P.D., Sartori M.; Girão M.J.B.C. *Impact of supervised physiotherapeutic pelvic floor exercises for treating female stress urinary incontinence*. *Sao Paulo Medical Journal.* 2007, 125, 265-269.
- [29] Hay-Smith E.B. K, Berghmans L.C., Hendriks H.J., de Bie R.A., van Waalwijk Des. *Withdrawn: Pelvic floor muscle training for urinary incontinence in women*. *Cochrane database of systematic reviews (Online).* 2006 (1).
- [30] Rett MS J.A., Hermann V., Gurgel MSC, Morais S.S. *Women's life quality after physical therapy treatment for stress urinary incontinence*. *Revista Brasileira de Ginecologia e Obstetrícia.* 2007, 29, 134-140.
- [31] In C. *Urinary Incontinence: Its Prevalence, Risk Factors and Effects on the Quality of Life of Women Living in a Region of Turkey*. *Gynecol Obstet Invest.* 2004, 58, 145-150.
- [32] Temml CH G., Schmidbauer J., Schatzl G., Madersbacher S. *Urinary incontinence in both sexes: prevalence rates and impact on quality of life and sexual life*. *Neurourology and urodynamics.* 2000, 19, 3, 259-271.

Address for correspondence:

Leila Beuttenmüller
 R. Pereira Valente, nº 220, apto. 1300
 Meireles, CEP: 60.160-250,
 Fortaleza-CE – Brazil
 phone: (55-85) 999-070-20.
 e-mail: lebecas@hotmail.com

Submitted: III 2010

Accepted: III 2010