



PILOT STUDY

# Effectiveness of a program of therapeutic exercises on the quality of life and lumbar disability in women with Stress Urinary Incontinence



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## KEYWORDS

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**Summary** Stress Urinary Incontinence (SUI) is a common condition and can cause social isolation and decreased quality of life. The literature demonstrates that perineal exercises are effective in promoting urinary continence and lumbar stability. This uncontrolled (group) pilot study, using a pre-test-post-test design, investigated whether a weekly session of Holistic Gymnastics® conducted during a one-year period, could change outcomes in a group of twenty women diagnosed with SUI. In the first and last evaluation, the subjects underwent a clinical examination and were asked to complete two questionnaires, one regarding quality of life and the other about lumbar disability. Improvement in the quality of life was observed in nine out of ten domains. There was also an improvement in lumbar disability. These results suggest that a program with therapeutic exercises can be effective in controlling urinary incontinence and improve the quality of life and lumbar disability in woman with SUI.

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## Introduction

Urinary Incontinence (UI) affects women of various ages worldwide. Its true prevalence is unknown and changes depending on age and ethnic groups as well as social and economic factors that interfere with the appearance of symptoms (MacDiarmid and Rosenberg, 2005; Nitti, 2001).

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The prevalence of UI can increase when it is evaluated as the involuntary leakage of urine and the presence of discomfort related to it (Nitti, 2001). This condition can cause social and hygiene problems that are easily noticeable (Abrams et al., 2002). Difficulty during sexual intercourse, such as the fear of urine loss or the need to interrupt sexual intercourse to urinate, and sleep disorders can also appear (Coyne et al., 2003). Stress Urinary Incontinence (SUI) consists of urine loss that occurs during any situation of physical effort, such as coughing or sneezing (Haylen et al., 2010).

There are several risk factors that may contribute to SUI, including pregnancy, vaginal childbirth, ageing, illnesses that involve chronic increase of abdominal pressure, menopause, hypooestrogenism, trauma, genetic factors, use of tobacco, and previous surgeries (MacDiarmid and Rosenberg, 2005; Schaffer et al., 2005). SUI predominantly occurs in women who have experienced vaginal childbirth, especially those who are multiparous, owing to the functional loss of pelvic organ support (Thompson et al., 2002).

Pelvic floor muscle (PFM) training provides positive effects in the treatment of UI, including a reduction in the frequency of urine leakage and improvement in muscular function with vigorous and resistant contractions in both static and dynamic forms (Tibaek et al., 2005). Improvement in muscular function contributes toward urethral resistance and visceral support and potentiates voluntary muscular contraction (Nitti, 2001); it also prevents the descent of the bladder and controls the urethral angle, thereby encouraging urethral closure during increases in intra-abdominal pressure (Morales et al., 1997). Besides the direct benefits on the pelvic organs, perineal contractions activate muscles that stabilize the vertebral column, such as the psoas, multifidus, and the transverse abdominal muscles (Richardson et al., 1999).

Holistic gymnastics is a method of therapeutic exercise in which the proposed movements take into consideration the peculiarities related to anatomical, physiological, sensorial, and motor characteristics by stimulating the best coordination of body attitude. This approach is based on respecting the rhythm and limitations of each patient. Movements are described orally and consequently, without a model for imitation, the patients try to achieve a gradual change of body engrams (Mendonça, 2000).

The method was developed in the 1940's by Lily Ehenfried, a German doctor and physiotherapist (Mendonça, 2000). The proposed movements reflect current thinking, considering the development of new imaging techniques to explain some empirical theories from the past.

## Example

One example of some of the 800 movements described is a movement called: PPTL (pieds, periné, transversus du abdomem et langue). The therapist asks the patient to gently press their feet onto the floor while contracting their perineal region during exhalation. At the same time they are encouraged to perceive the synergical simultaneous contraction of their transversus abdominis and to press their palate, with their tongue. Many studies corroborate the

benefit of integrating the core stabilizers of low back with sensory feedback (Hodges and Richardson, 1999; Hodges et al., 2001a,b). The global character of the method and the correlation of respiratory and perineal diaphragms allows the evaluation of lumbar function to be included as an option.

The purpose of the study was to evaluate the effects of a specific program of therapeutic exercises on the quality of life and lumbar disability in women with SUI. This uncontrolled (group) pilot study, using a pre-test-post-test design contains only a single group. The study's hypotheses state that the intervention program will improve continence and quality of life, and reduce lumbar disability in woman with SUI.

## Methods

A pre-test-post-test study was conducted on a convenient sample of 20 female patients, aged between 35 and 65, who were selected from the physiotherapy department of the Gaffrée and Guinle University Hospital (GGUH). Women who complained of SUI and agreed to the terms were included in the study. The exclusion criteria were associated neurological diseases, oncologic diseases, infections, pregnancy, serious cognitive changes, and the non-fulfilment of a gynaecological examination for more than a year. The research project obtained the approval (number 50/2011) of the committee of ethics and research of the GGUH.

Each patient was individually evaluated using specific anamnesis forms elaborated by the authors of the project. The King's Health Questionnaire (KHQ), used for women with UI and the Oswestry Disability Index (ODI) questionnaire for lumbar disability, both of which are self-applicable, were translated into Portuguese and validated for use. Evaluation of perineal muscle by bidigital palpation was done during a physical examination. In spite of the lack of evidence for clinical use, the muscle test is of low cost and is comparable between examiners (Knorst et al., 2011). The presence or absence of synergistic contraction of the transverse abdominal muscle was noted.

The KHQ is considered the best instrument for the evaluation of quality of life, specifically in a population with urinary incontinence. The evaluation is divided into eight domains that are related to general health perceptions, the impact of UI, role limitations, physical and social limitations, personal relationships, emotions and sleep/energy disturbances, respectively. Two independent scales are also included: one to evaluate severity measures and the other to evaluate the presence and intensity of symptoms (scale of urinary symptoms). Numerical values added and evaluated by the domains are attributed to all of the answers. The values vary between zero and one hundred, with increasing values indicating a worsening of quality of life. There is no numerical reference to indicate a final value for the qualification of incontinence severity, but a comparison can be done to each of the domains. The KHQ was translated and validated in Portuguese (Tamanini et al., 2003; Fonseca et al., 2005).

There are ten questions related to lumbar disability in the ODI questionnaire. The first part is about pain intensity,

while the other parts refer to the impact of lower back pain on activities of daily life. The scoring varies from zero (without disability) to one hundred (higher disability) and the level is defined as low (0–20%), moderate (20–40%), and serious (40–60%). For a value of over 60%, the patient is considered an invalid or restricted to bed (Roland and Fairbank, 2000).

## Intervention

The first examination was individualised. Using bidigital palpation, the pelvic floor muscle contraction was motivated through a proprioceptive stimulus with the physiotherapist's touch and any incoordination was corrected. Muscle training was initiated with isometric contractions and phasic contractions. During the bidigital palpation, the patients were asked to contract their muscles around the fingers of the examiner and lift them up in a cephalic direction. The common incoordination signal that was most observed was the use of the Valsalva manoeuvre (apnoea with expulsive force) instead of exhaling during the process.

The criterion established for inclusion in the treatment group was a pelvic floor muscle contraction of more than, or equal to, 3 in the classification according to the modified Oxford scale (Baracho, 2012). Women with a lower score were treated individually until they achieved the minimum score.

The holistic gymnastics method was used in group care. As a principle, the method uses an oral description of the movements to create better body engrams for the perception of the developed gesture. For this reason, the selected common movements were the simplest and most appropriate for the patients' sociocultural profiles and were described using daily words to enhance comprehension.

During the year in which these patients were treated, in addition to PPTL, three other movements were emphasized at the weekly meetings, to encourage repetition in the home.

To help with the proprioception of the pelvis, we asked the supine subjects to put two used tennis balls on either side of the promontory of the sacrum, and whilst in that position, with knees bent, feet on the ground and pelvis parallel to the floor, to begin a sliding movement to both sides. The same was repeated at the mid-level of the sacrum and a final line near the coccyx. The participants were encouraged beforehand to imagine the sacrum in the format of an inverted triangle, thus drawing the tennis balls closer together between the first and third line at each stage of the movement.

To promote the mobility of the sacroiliac joints, we asked them to lie on their sides with their knees and hips bent at a 90-degree angle. Palpating the ischium, during exhalation, we requested the elevation of the knee without allowing the pelvis to roll back, opening the upper entrance to the pelvis and facilitating the contraction of the perineum, easily noticed by palpation of the ischium. During inhalation, we asked them to perform a different movement, raising the leg (the one furthest from the floor) towards the ceiling, whilst maintaining the knees together.

To facilitate the selective contraction of both the anterior and posterior parts of the perineum, we asked the

participants to bring both knees to their chests and hold them with their hands. In that position, upon contracting the perineum, they were encouraged to notice the ease with which they could contract the anterior part of the perineum and the resistance offered to the posterior part. Following on from that we then asked the students to put their legs in a frog position, with the soles of their feet together and their knees apart. The position is favourable to the contraction of the posterior part of the perineum and offers resistance to the anterior part.

The concentration on movement execution was augmented during the year working with the method. They learned to work in silence, which increased body awareness, and they started sharing their impressions with the group. The classes initiated experiences to promote the awareness of the pelvic region. The evolution of the sessions included exercises to provide mobility to the pelvic region and also to the participants' sympathetic and parasympathetic innervation zones. The final movements aimed to strengthen the pelvis in a more organised posture. Using the principle of globality the authors proposed movements integrating the diaphragm. Patients were encouraged to repeat the suggested movements at home during this process.

No specific respiratory pattern was used whilst executing the movements because the method is based on respiratory perception instead of imposing a specific rhythm. The only exceptions were specific movements involving perineal contraction, which were executed during the expiratory phase in order not to increase pressure on the abdominal viscera.

After 3 consecutive weeks without any involuntary leakage of urine, patients were encouraged to continue biweekly until the one-year follow-up. Those that continued with involuntary urine loss were referred for medical evaluation. After 12 months, the clinical exam and questionnaires were done again.

The data were stored using Microsoft Excel and processed using the Statistical Package for the Social Sciences (SPSS, version 17). Normal probability plots were made for each variable. Data distribution of each variable was verified through the Shapiro–Wilk's test. The results were presented in proportions and measures of central tendencies. The before-and-after comparison was performed using the Wilcoxon signed-rank test. The correlation analysis was done using the Spearman's rank method owing to the non-parametric distribution of data. The significance level was established at 5% ( $p < 0.05$ ).

**Table 1** Demographic characters of 20 patients with UI submitted to a program of therapeutic exercises.

	Average and deviation patterns
Age (years)	67.00 ( $\pm 12.93$ )
Weight (kg)	67.50 ( $\pm 14.03$ )
Height (metres)	1.56 ( $\pm 0.06$ )
Corporal Mass Index	27.19 ( $\pm 5.57$ )
Years of study	9.26 (2.99)
Climacteric (percentage)	85%

**Table 2** Frequency of related symptoms of SUI.

	UI group (n = 20) (percentage)
Loss of urine during effort	90%
Difficulty in continence of flatus	35%
Fecal incontinence	15%
Constipation	80%
Sensation of residual urine	45%
Inability of the interruption of urine flow	50%
Maintenance of voiding after micturition	50%
Sexual activity	40%
Anorgasmia	62.5% <sup>a</sup>
Dyspareunia	25% <sup>a</sup>
Use of a kind of cover	60%

<sup>a</sup> As a percentage of the sample that involves sexual activity.

## Results

The majority of the patients were in the climacteric stage. Overweight was characterised by the average corporal mass index (CMI) of 27.19 (SD ± 5.57). The average level of schooling was 9.26 years of study, which can be considered as having completed first grade. The demographic data are described in Table 1.

All patients were diagnosed with SUI, but six presented a history of previous pelvic surgeries and two of them had undergone perineoplasty. Most of the women were multiparous (80%) with vaginal births. Just five (25%) women did not do any physical activity. More than 50% of the patients used some type of protection such as sanitary pads especially during activities outside the home.

Evaluation of anorgasmia and dyspareunia were only considered in sexually active women. Constipation occurred in 80% of the sample. Table 2 indicates the distribution of some symptoms of SUI.

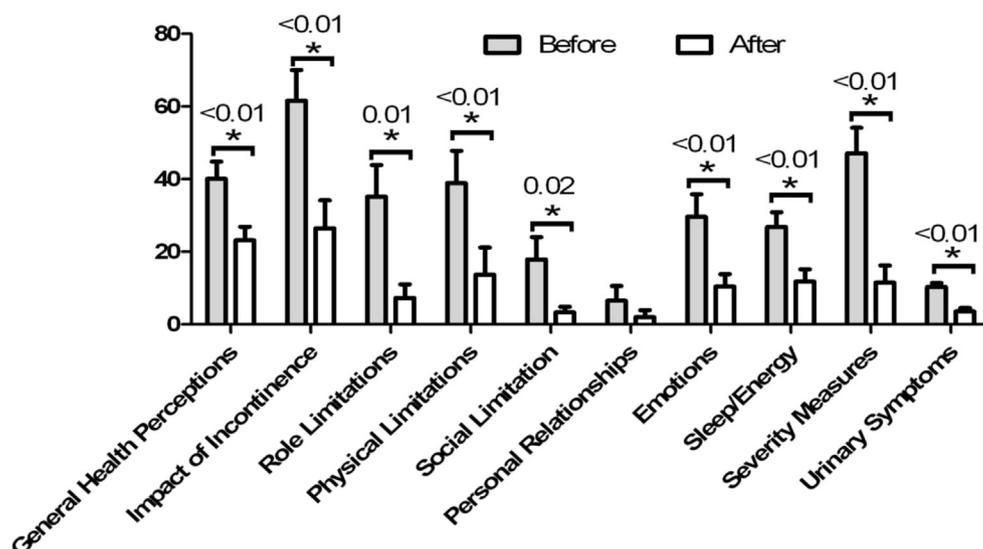
In the physical exam, only five women had perineal contraction more than or equal to three in the classification based on the modified Oxford scale. After intervention, the majority remained at grade three, which was sufficient for the maintenance of continence, four of them reached grade four and only two achieved grade five. In the KHQ comparison (Fig. 1), there was improvement in all of the domains; however, only "personal relationships" was not statistically significant ( $p = 0.10$ ).

Lumbar disability was not the major symptom that referred patients for treatment but was noticed in 19 women simultaneously with incontinence. At the beginning of the programme, the disability was minimal in ten, moderate in eight and severe in one. After intervention with weekly sessions of the holistic gymnastics method, the number of women with lumbar disability reduced to 16; in 13 it was minimal and in three moderate. The average of disability was reduced ( $Z = -3.30$ ;  $p < 0.01$ ).

The improvement of the pelvic floor muscle contraction was mild ( $Z = -3.46$ ;  $p < 0.01$ ) but statistically significant and adequate for continence. The results generated an improvement in nine domains of The KHQ. The personal relationships domain was the only domain that didn't show a significant difference between the before and after intervention. Table 3 shows the results of the evaluation of muscle contraction, quality of life, and lumbar disability.

## Discussion

The sample mainly consisted of multiparous women who were overweight and physically active. They also showed a



**Figure 1** Comparison of the King's Health Questionnaire domains before and after intervention in 20 patients with Stress Urinary Incontinence. Data are shown as a bar chart showing  $M \pm SD$ . Differences between before and after intervention scores for each domain of The King's Health Questionnaire were compared with the Wilcoxon signed-rank test. \* $p < 0.05$ , indicating significant differences between pre- and post intervention scores.

**Table 3** Comparison of quality of life, lumbar impairment, and pelvic floor muscle contraction before and after intervention ( $n = 20$ ).

	Before (average and deviation patterns)	After (average and deviation patterns)	Z-value	P value
Lumbar impairment	24.22% ( $\pm 15.46$ )	14.03% ( $\pm 15.97$ )	-3.30	<0.01*
Pelvic floor muscle contraction	2.16 ( $\pm 1.04$ )	3.50 ( $\pm 0.76$ )	-3.46	<0.01*
KHQ domains:				
General health perceptions	40.09 (20.10)	23.15 ( $\pm 16.05$ )	-2.72	<0.01*
Impact of UI	65.29 ( $\pm 33.18$ )	26.46 ( $\pm 31.62$ )	-2.77	<0.01*
Role limitations	33.33 ( $\pm 34.42$ )	7.29 ( $\pm 14.86$ )	-2.56	0.01*
Physical limitations	40.19 ( $\pm 38.66$ )	13.72 ( $\pm 30.75$ )	-2.68	<0.01*
Social limitations	18.95 ( $\pm 26.28$ )	3.27 ( $\pm 6.35$ )	-2.41	0.02*
Personal relationships	6.86 ( $\pm 17.73$ )	1.96 ( $\pm 8.08$ )	-1.63	0.10
Emotions	31.37 ( $\pm 26.12$ )	10.46 ( $\pm 13.87$ )	-2.95	<0.01*
Sleep/Energy disturbance	27.44 ( $\pm 17.71$ )	11.73 ( $\pm 14.14$ )	-2.85	<0.01*
Severity measures	49.53 ( $\pm 28.73$ )	11.51 ( $\pm 19.61$ )	-3.04	<0.01*
Urinary symptoms	10.65 ( $\pm 4.36$ )	3.59 (3.77)	-3.21	<0.01*

\* – Significance level < 0.05. Wilcoxon signed-rank test was used as a result of non-parametric distribution.

low level of schooling and were diagnosed with SUI. The use of sanitary pads was reported by 60% of the group.

When compared with the Knorst study (Knorst et al., 2011), 80% showed multiparity in comparison to 50% and 80% described constipation in contrast to 45.2%. The climacteric factor, which was frequently noted in the studied group, was considered an aetiological factor that is important for SUI as previously discussed. Of the twenty evaluated women, 85% found themselves in this phase.

Only one participant had not experienced a vaginal birth. Most of the participants did not know that they would experience episiotomy, in spite of this being a common procedure in Brazilian obstetric clinics; only 68.4% of women described this in the Knorst study (Knorst et al., 2011). The majority of the patients reported flatus and faecal continence indicating relative preservation of the anal sphincter. The sensation of residual urine and the permanence of voiding after micturition as well as the inability to interrupt the flow of urine, reflected the loss of neurological coordination of detrusor and pelvic floor muscles.

In 2010, Oliveira et al. tried to relate CMI increase with the quality of life in women with UI using the KHQ. Despite any association found in the study, being overweight can modify the relationship between the connective tissue and the viscera. It can lead to ptosis (descensus), even without the evidence of pelvic organ prolapse. When constipated patients used the Valsalva manoeuvre at a particular frequency during defecation, the abdominal and perineal pressures were increased.

Although the progress of pelvic floor muscle contraction was modest, it was sufficient for continence. Many studies have explained continence as a multimodal factor that includes a change of daily habits, home advice, diet, and household exercises in particular. Balmforth et al. (2006) demonstrated that pelvic floor muscle training can guide the levator ani to a resting position that is cephalic, thereby increasing continence. Those women who were physically active probably accelerated the process of recovery.

An increase in the quality of life occurred in all the domains of the KHQ. Knorst et al. (2011) demonstrated a reduction in the quality of life in several domains of the KHQ in women with UI. The reduction of physical limitation and the sensation of the impact of UI were the domains that were related to the number of sessions needed so that the patients could return to total continence. At the baseline of the present study, 60% of the women used some kind of absorbent. At first, there was a supposition that the number of daily changes could be a predictive factor and an easy way of assessing changes in symptoms. The low number of changes was reflected in the high grade of social isolation only in patients that described the necessity of using absorbents while going outside the home.

In a study of 97 incontinent women that also used the KHQ as an instrument of evaluation of the quality of life, there was a reduction of 50% in volume of urine loss within fourteen weeks of intervention and an improvement in six domains of the questionnaire (Balmforth et al., 2006). The results do not show a significant improvement in the personal relationship domain, as Balmforth et al. (2006) previously reported. This fact may demonstrate that these women can take measures to prevent urine loss in their personal relationships.

Using the concept proposed by Richardson et al. (1999), lumbar incapacity was taught by the synergism of the pelvic floor muscles with the activation of deep muscles and stabilisation of the trunk. Decreases in lumbar impairment with the interventions reached expectations, as evidenced in the statements made by the patients, which suggested a reduction in the lumbar symptoms during the group sessions. Some women mentioned improvements in pain in other regions of the body, confirming the global character of the method. To date, no research has recorded lumbar impairment in patients with UI.

Holistic gymnastics makes therapeutic exercise in a group possible and motivates patients and increases participation. The educational character of the method encourages the recognition of one's own body and the assimilation of this into daily life. One of the movements of

the method called PPTL (*pieds, perinée, transversus abdominalis, langue*) uses synergic and complementary activities of the main fascial diaphragms (muscle-fibrous structure) as its principle. These diaphragms integrate themselves and are distributed horizontally by the tentorium cerebelli, upper trunk, abdominal, pelvic, and peripheral diaphragm making connections to the longitudinal axis and helping body posture (Debroux, 2002). The position of the levator ani, forming a muscular diaphragm inside the pelvis, means that it is the only muscle group in bipeds that is capable of providing structural support for pelvic organs (urethra, vagina and rectum) (Balmforth et al., 2006).

Studies about UI have established that exercises are the best choice for treatment; however, in a recent systematic review (Hay-Smith et al., 2012), the authors found no strong evidence for the best approach to pelvic floor muscle training. Programs with higher personal contact (individual programs vs. group programs) were thought to be more efficient. Women appeared to report more improvement when there was more contact with the health professionals that were responsible for the treatment program. The results of the present study showed improvements in urinary continence, quality of life, and low back disability, all of which were reported despite the choice of group treatment sessions. The proprioceptive character of the method could have helped to prolong the body awareness and motivate the interaction among the participating women. They seemed confident enough to share experiences and improvements, thereby encouraging the group.

### Limitations of the study

The low level of education among the patients meant that the authors had to adapt the procedures. The voiding diary was not used, as the participants did not understand how to complete the questionnaires. The choice of program used in the sessions were kept unchanged so that the movements could be assimilated for repetition at home. The physical environment used was not projected as specifically required for the intervention, which could have limited the performance. Possible risk factors could not be controlled owing to the lack of information; for example, the use of episiotomy of vaginal birth or structural lesions in previous surgeries. These factors can contribute toward the appearance of pelvic organ prolapse and are relevant when associated with other factors, such as ageing and hormonal changes leading to the appearance of incontinence symptoms (Mesin et al., 2009; Schaffer et al., 2005).

The evaluation of the effectiveness of this program of therapeutic exercises was via a pre-test-post-test study design, which limited the results, as there was no control or other treatment groups; this should be considered in further studies.

### Conclusion

The results of the self-evaluation of women with UI show that there was an improvement in the quality of contraction of the pelvic floor muscles. Thus, a specific program of therapeutic exercises can be effective in the control of

urine loss and can lead to the improvement of quality of life and lumbar impairment.

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