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Global Postural Re-education: an alternative approach for stress urinary incontinence?

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ABSTRACT

Objective: The aim of this study was to evaluate the impact of Global Postural Re-education (GPR) on stress urinary incontinence symptoms and to compare it to Pelvic Floor Muscle Training (PFMT).
Study design: Fifty-two women with stress urinary incontinence were distributed into two groups: Group 1 (G1) was submitted to weekly sessions of GPR for three months and Group 2 (G2) performed Pelvic Floor Muscle Training four times a week for three months. Patients were evaluated through the King's Health Questionnaire, a three-day voiding diary including daily pad use and a Functional Evaluation of the Pelvic Floor (FEPF), before treatment (T0), at the end of treatment (T1) and six months after treatment (T2).
Results: The number of leaking episodes dropped significantly in both groups at the end of treatment and at six months follow-up, with a significantly greater decrease in G1. Daily pad use dropped significantly in both groups. At the end of treatment, 72% of the patients in G1 and 41% of the patients in G2 needed no pads and at six-month follow-up, 84% and 50%, respectively. FEPF improved significantly in both groups, with no significant difference between the groups ($P = 0.628$). The King's Health Questionnaire demonstrated significant improvement in both groups and in all domains. The GPR group presented higher adherence to treatment, with no dropouts.
Conclusions: GPR could represent an alternative method to treat stress urinary incontinence in women, should the results be long lasting.

1. Introduction

Urinary incontinence (UI) is defined by the International Continence Society (ICS) as any involuntary loss of urine [1] and it has a high prevalence among women in all ages [2]. In a study conducted in Campinas, Brazil, UI was mentioned by 35.0% of women aged 45–60 years [3]. This symptom has serious impact on Quality of Life (QoL), with social, physical, emotional and psychological implications, besides the high cost associated with its treatment. In the United States, where 17 million patients have daily UI, expenditure is approximately U$32 billions a year [4].

Stress urinary incontinence (SUI), defined as an involuntary loss of urine as a consequence of physical exercise or effort such as sneezing or coughing [1], is the most common cause of UI in the reproductive years. Age, parity and mode of delivery are among the risk factors for SUI, although young and nulliparous women may also experience UI [5]. With the increase in life expectancy, more women will become susceptible to UI, and treatment by effective and less invasive techniques is timely. A conservative approach by Pelvic Floor Muscle Training (PFMT) has long been considered as the first option for the treatment of SUI. It yields good results, offers no risk for the patient, has no side effects, may be associated with other therapies and can even be followed by surgery in refractory cases. Total adherence of the patient to the program, with continued exercises after the end of treatment, is a condition for long lasting results [6].

Global Postural Re-education (GPR) was developed in France by Philippe Emmanuel Souchard in 1981, after 15 years of research in the biomechanical domain. It is based on the assumption that muscles are organized in chains that are responsible for keeping the vertical erect posture [7,8], which is possible due to the tension distribution among the muscles. These muscles are constantly fighting gravity and have a tendency to be shortened. GPR promotes a functional change in the daily gestures of the patients, allowing these muscles to perform their role in the muscle chain that is responsible for the organization of the static posture and movements. Research shows the response of PFM to changes in the position the body segments. This reaction of muscles, as a response to these changes in posture, results in a tension adjustment that

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guarantees stability and balance in the execution of movements. Stress urinary incontinence is intimately associated with pelvic floor muscle function, and pelvic floor muscles are also part of the body stability mechanism. Other muscles, such as the abdominal muscles, have proven to be relevant to the continence mechanism.

The transversus abdominis muscles and diaphragm are responsible for maintaining intra-abdominal pressure (IAP), important for the stability of the low back and pelvic organs. Abdominal muscle weakness changes the pelvic position and leads to a hyperlordosis and low back pain and studies have shown that these dysfunctions are connected to changes in the PFM activity [9–15]. GPR works to normalize the respiratory function and diaphragm, improve the abdominal muscle activity and fix spine misalignments and imbalances, which will result in an improvement in the PFM activity and help the continence process.

GPR uses postures that stretch the muscle chains, positioning the patient in a way that all the muscles are tensioned at the same time, avoiding any retraction and compensation that might be in the muscle chain. By doing so, it is possible to correct all the imbalances and reorganize the posture and its correct equilibrium. As a consequence, the function of the compromised organs could be re-established. It has been hypothesized that GPR could influence stress urinary incontinence symptoms.

2. Materials and methods

This was a prospective, comparative and controlled cohort study, by consecutive patients. Fifty-two patients were selected from the Female Urology Clinic of the State University of Campinas, Brazil and divided into two groups of 26 women. Only women with SUI were included. Exclusion criteria were genital prolapse grades III and IV [16] and the presence of overactive bladder (OAB) symptoms. Before treatment all women underwent physical and uro-gynecological examination, urine tests and complete multichannel urodynamics.

Subjective perception of cure was classified according to the following criteria: cure (no leaking); improvement (perception of reduction in leaking episodes) or no change. Before treatment (T0), at the end of treatment (T1) and at six months follow-up (T2), patients performed the King's Health Questionnaire [17] and a three-day voiding diary, including daily pad use [18] were undertaken and all patients were submitted to a Functional Evaluation of the Pelvic Floor (FEPF) [19].

For the FEPF, the patient is positioned in a supine position with bent knees. She is asked to contract the PFM, by bringing the perineum up (towards the head). The therapist observes if there is perineal movement and characterizes the perineal function as follows: *Perineal Objective Function* is the patient's ability to perform a contraction which can be visible to the therapist; *Weak Objective Perineal Function* is a tenuous lifting of the perineum; and *No Objective Perineal Function* is lack of movement.

Subsequently, the index and middle fingers are introduced 2–3 cm into the vaginal introitus and the patient is asked to do another contraction. The therapist observes if there is a contraction felt by the fingers, the contraction quality and the patient's ability to keep it. Later, the therapist applies, using the fingers, a resistance to the elevation of the perineum and observes patient's ability to contract the muscles in this condition. The patient is asked to maintain this contraction for at least 5 s. The classification is done as follows:

- Level 0 – No objective perineal function, not even with vaginal palpation.
- Level 1 – No objective perineal function, contraction perceived only by vaginal palpation.
- Level 2 – Weak objective perineal function, recognized by vaginal palpation.
- Level 3 – Presence of objective perineal function and no resistance to vaginal palpation.
- Level 4 – Presence of objective perineal function and resistance to palpation, but not sustained.
- Level 5 – Presence of objective perineal function and opposite resistance maintained more than 5 s.

Group 1 (G1) was treated by GPR, with individual weekly sessions of 50 min for three months. In each session, patients performed stretching postures according to the GPR method of Souchard. The postures are individually defined for each patient after postural evaluation by a physical therapist with the aim of global musculoskeletal restructuring, with emphasis in the pelvic area [7,8].

The objective of GPR is to correct postural misalignments, by stretching the muscle chains in order to eliminate the shrinkages that alter the normal posture, and to recover muscular strength. It is, therefore, a posture restructuring that benefits the functions. In the initial evaluation, the postural pattern is observed and postural misalignments and the flabby, shortened and retracted muscles are identified. Based on this assessment, the most appropriate positions for the treatment are chosen.

Patients also performed postures that simulate daily activities that may lead to incontinence, such as standing, sitting and leaning forward. The length for each posture respected each patient's resistance, increasing in each session. Patients received guidance on postural habits that benefit the maintenance of posture and function of the musculoskeletal system, including the pelvic floor. Fig. 1 presents the eight postures used in the GPR program.

Group 2 (G2) performed PFMT four times a week, one under supervision of a physical therapist and three at home for three months, respecting the following protocol [18]:

- Three series of 10 long contractions, sustained for 6–8 s. After each contraction, patients were asked to rest for the same period of time.
- Two series of 10 fast contractions, sustained for 1–2 s. After each contraction, patients were asked to rest for twice the time of the contraction.

This protocol is maintained during the whole treatment, with the same frequency and number of contractions. To ensure the adherence of patients to the program a spreadsheet, which had to be filled in by the patient at home when performing the exercises, was developed and checked every week. At the beginning of treatment, all patients received information about the location and function of pelvic floor muscles and an orientation on the conscious usage of the muscles in times of increased intra-abdominal pressure, until automatism was restored.

This study was approved by the Research Ethics Committee on the 20th of January of 2004 (611/2003).

The determination of the power of the sample (1-beta) was done with the Pad Use variable, by fixing the significance level to 5% and the sample and group size (n). The interclass correlation coefficient and the delta (comparison between groups) were calculated and the results were 0.473 and 0.850, respectively. The result power of the sample was 82.3% (significance higher than 80%), which allowed the conclusions of this study.

2.1. Statistical analysis

To describe the sample profile according to the study variables, tables of frequency were created for the categorical variables, with

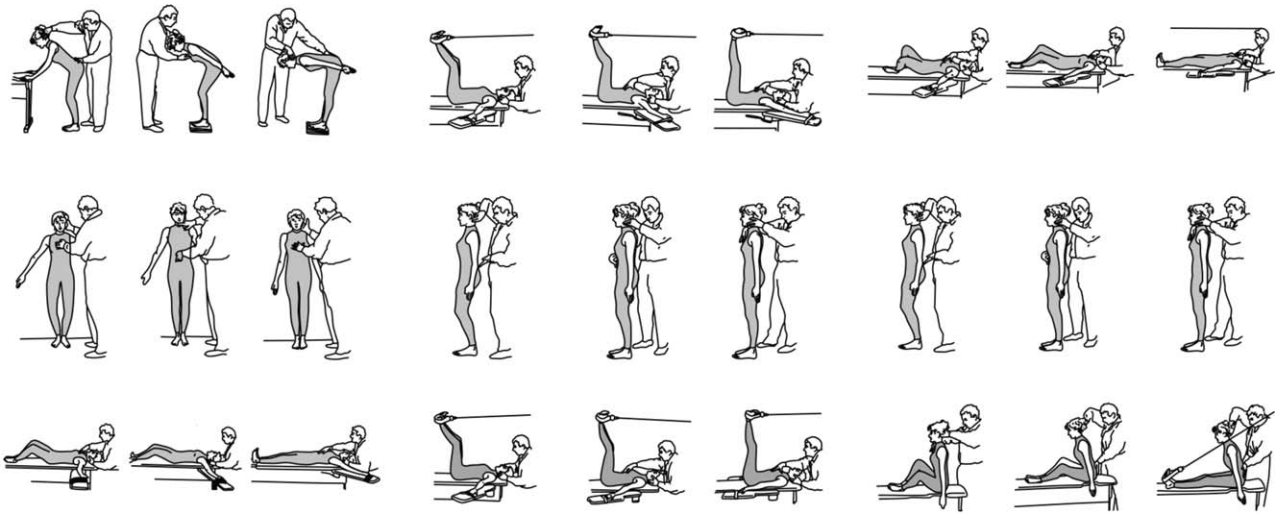

Fig. 1. Global Postural Re-education stretching postures.

Table 1
Descriptive and comparative analysis of the characterization variables of G1 and G2 (averages).

Characteristic	GPR treatment					PFMT treatment					*P*-value (Mann–Whitney)
	Average	Min	Mean	Max	SD	Average	Min	Mean	Max	SD	
Age (years)	52.1	30	53	72	11.8	47.6	33	48	60	8.1	0.1958
Height (m)	1.6	1.5	1.6	1.7	0.1	1.5	1.4	1.6	1.7	0.1	0.3467
Weight (kg)	64.6	43.0	64.0	90.0	12.0	69.9	56.0	68.5	89.4	10.5	0.1676
BMI	26.1	19.9	25.3	34.8	4.3	29.3	21.6	29.3	38.5	4.8	0.0733
Symptom duration (years)	6.3	1.0	3.0	20.0	6.1	8.7	0.1	5.0	30.0	9.1	0.7557
Pregnancy (number)	3.0	0.0	2.0	9.0	2.6	3.1	1.0	3.0	5.0	1.2	0.4447
Vaginal delivery (number)	2.2	0.0	2.0	7.0	2.1	1.9	0.0	2.0	5.0	1.6	0.6196
Cesarean section (number)	0.2	0.0	0.0	1.0	0.4	0.9	0.0	0.0	4.0	1.2	0.0363

the absolute frequency values (n) and percentage (%) and descriptive statistics of the continuous variables: mean, standard deviation, minimum, maximum and median values.

To analyze the subjective evaluation, the absence of symptoms and the improvement percentage, a confidence interval (CI) of 95% was calculated and hypothesis for proportion and mean difference from zero were tested. Variance Analysis (ANOVA) was used for repeated measurements, to compare the numerical variables between the two groups and the three evaluations. For the analysis of the evolution between times and in each group, the Profile test by Contrast was used. The variables were transformed in positions or ranks, due to the lack of Normal distribution.

The significance level for these tests was 5%, meaning, $P < 0.05$.

3. Results

Descriptive and comparative analysis of the characterization variables showed no significant differences between groups ($P > 0.005$), characterizing the homogeneity of the sample. Data are given in Tables 1 and 2. In Group 1 there was only one dropout in the treatment program, while in Group 2, from the 26 that were initially in the program, only 17 completed the treatment.

Subjective evaluation of cure reported by the patients is presented in Fig. 2. In G1, at the end of treatment (T1), 16% of the women considered them cured, 72% improved and 12% did not report changes. At six-month follow-up (T2), 24% of the women reported cure, 64% improved and 12% no change. In G2, at the end of the treatment (T1), no patient was cured, 69% reported improvement and 31% reported to no change. At six-month follow-up (T2), 19% of the patients reported cure, 37.5% improvement, 31% reported no change and 12.5% reported recurrence of symptoms.

Fig. 3 presents the significant drop in the number of incontinence episodes in both groups, at T1 and T2, with a significantly greater drop in G1. There was also a significant decrease in pad use in both groups, at T1 and T2, with a significantly higher proportion of women needing no pads in G1 when compared to G2 (Fig. 4).

FEPF improved significantly in both groups, at T1 and T2, with no differences between groups (Fig. 5). Analysis of the King's Health Questionnaire demonstrated significant improvement in both groups in all domains (Table 3).

Table 2
Descriptive and comparative analysis of the characterization variables of G1 and G2 (percentages).

Characteristic	GPR treatment		PFMT treatment		*P*-value
	No	Yes	No	Yes	
Menopause	38.10%	61.90%	46.67%	53.33%	0.6071 (χ^2)
Hormonal reposition	80.95%	19.05%	93.33%	6.67%	0.3761 (Fisher)
SUI surgery	57.14%	42.86%	64.71%	35.29%	0.6353 (χ^2)

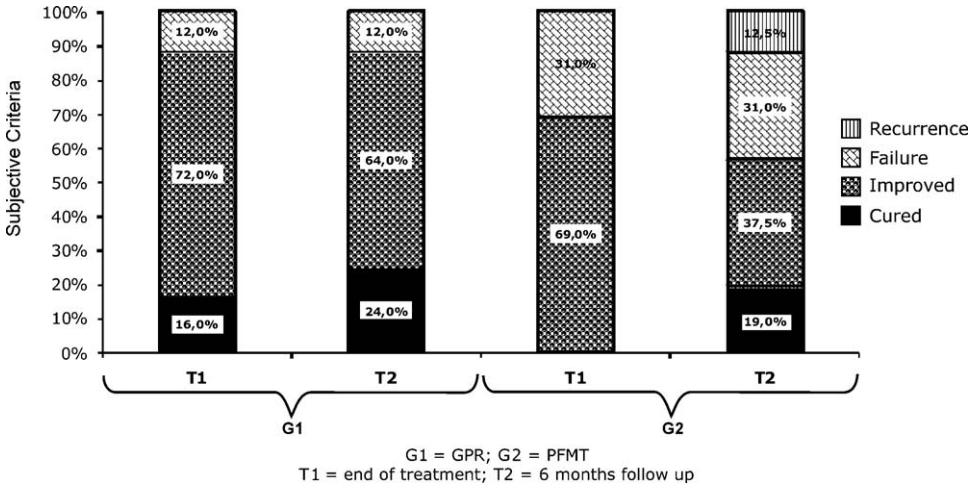

Fig. 2. Subjective evaluation at T1 and T2.

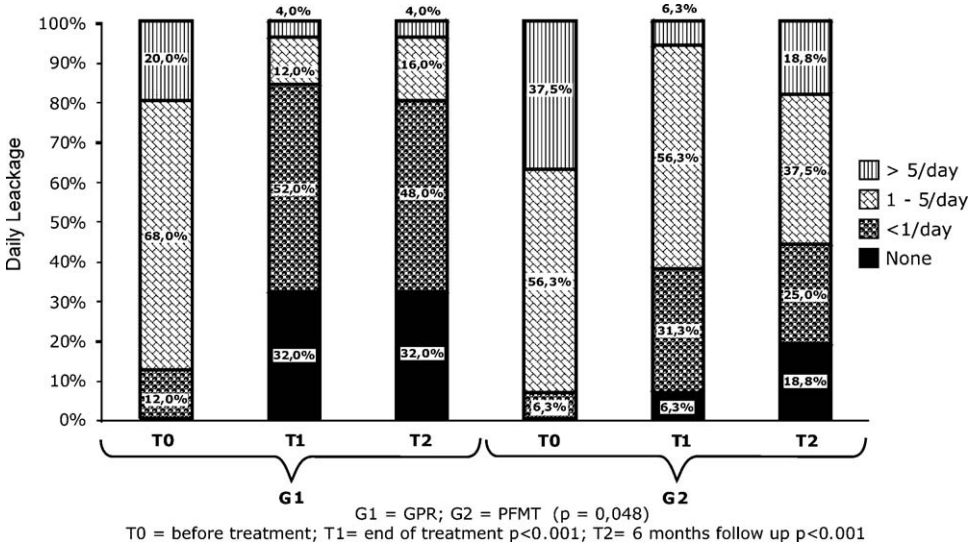

Fig. 3. Incontinence episodes at T0, T1 and T2.

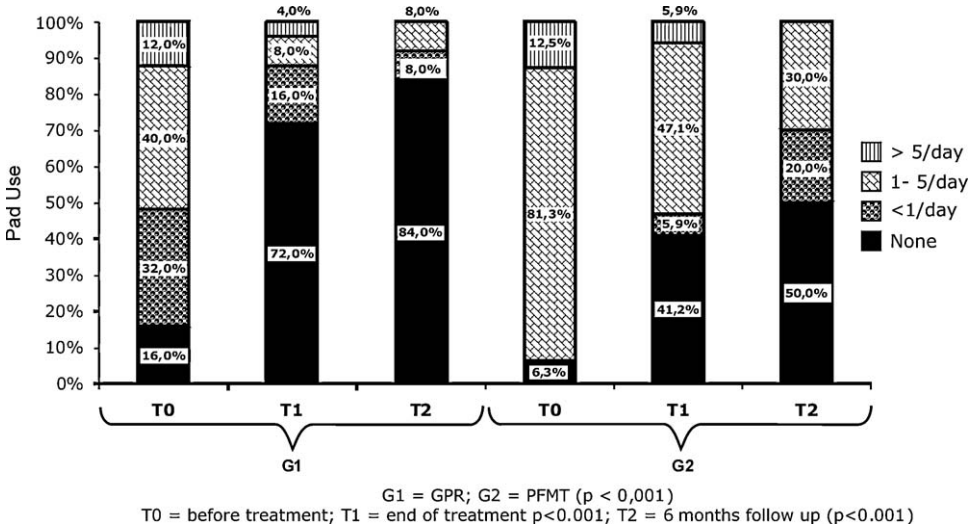

Fig. 4. Pad use at T0, T1 and T2.

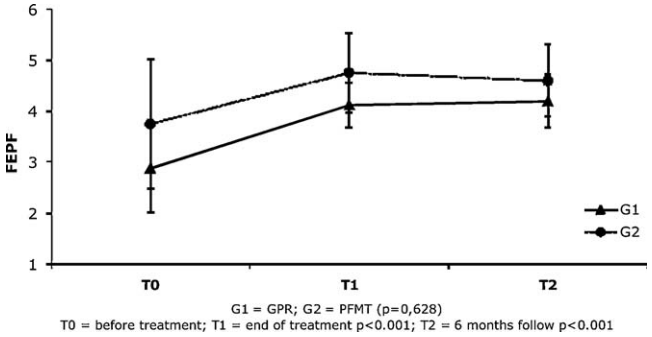

Fig. 5. Functional Evaluation of the Pelvic Floor T0, T1 and T2.

4. Comments

The GPR technique was developed for the treatment of skeletal muscle dysfunctions that generate orthopedic problems, such as pain, inflammation, joint limitations and hernias [20,21] and pulmonary dysfunctions [22]. This is the first study to evaluate the effects of this technique in the treatment of women with SUI symptoms. GPR is an individual treatment and patients are actively involved and motivated to understand and to be in charge of their body. During the treatment, they are constantly asked to perform postural adjustments and maintain them as long as they can, which guarantees the stretching of the muscular chain and the necessary restructuring. The outcome of the treatment is improved flexibility, elasticity and muscle strength and range of motion [23]. Later, patients are instructed about new behaviors in their daily activities. Their posture changes and their movements favor the maintenance of the muscle activity. These changes result in more physiological postures that may improve their pelvic floor muscle performance during daily activities, keeping them healthy. This therapy is based on a thorough analysis and observation of anatomy, physiology and the way in which the person becomes ill (evolution of symptoms). GPR starts from the individuality of each person in order to design an overview treatment, which starts from presentation of symptoms and searches out and resolves its causes as well as the consequences. While the majority of classic physiotherapy modalities concentrate on a specific part of the body alone, with GPR we treat the body as whole in an overall way, and at the same time we grant an active role to the patient, who is also a protagonist in his/her recovery. This concept allows more efficient and longer lasting results [24].

Fig. 6 shows a picture of a patient before and after GPR treatment. This patient had improvements in the SUI symptoms after GPR treatment.

Variations in intra-abdominal pressure are well known to be involved with the continence mechanism [13]. The continuous tension adjustment of the PFM during body movements favors its constant activity [10]. The reflex contraction of the PFM, moving the vaginal wall towards the pubis and helping the urethral closure mechanism, precedes the intra-abdominal pressure increase, preventing the incontinence episode [25]. In the literature, there is evidence of the relation between the maladjustment of the lumbar area and the pelvis, the failure in the adequate distribution of effort in this area, lumbar pain and UI [26–29] and this might be one reason why GPR influences pelvic floor response to stress.

Table 3
Results of the King's Health Questionnaire domains.

King's Health Questionnaire domain	Time	GPR treatment					PFMT treatment					*P*-value (Mann-Whitney)
		Average	Min	Mean	Max	SD	Average	Min	Mean	Max	SD	
General perception of health	T0	45.00	0.00	50.00	100.00	28.87	45.59	0.00	50.00	75.00	22.07	$P=0.778$
	T1	34.00	0.00	25.00	100.00	29.65	41.18	25.00	25.00	75.00	19.65	$P=0.222$
	T2	26.04	0.00	25.00	100.00	24.98	36.36	0.00	25.00	75.00	25.89	$P=0.205$
Incontinence impact	T0	60.66	0.00	66.66	100.00	34.99	75.49	33.33	100.00	100.00	28.94	$P=0.162$
	T1	24.66	0.00	33.33	100.00	29.31	50.98	0.00	33.33	100.00	42.68	$P=0.052$
	T2	26.39	0.00	16.67	100.00	32.57	30.30	0.00	0.00	100.00	40.70	$P=0.954$
Role limitations	T0	40.66	0.00	33.33	100.00	35.71	60.78	0.00	66.66	100.00	34.83	$P=0.080$
	T1	13.33	0.00	0.00	100.00	26.35	33.33	0.00	16.66	100.00	37.27	$P=0.051$
	T2	9.03	0.00	0.00	100.00	21.97	34.85	0.00	0.00	100.00	46.22	$P=0.130$
Personal limitations	T0	44.00	0.00	33.33	100.00	37.54	66.66	0.00	83.33	100.00	34.36	$P=0.059$
	T1	19.33	0.00	0.00	100.00	33.91	39.21	0.00	50.00	100.00	35.33	$P=0.072$
	T2	11.11	0.00	0.00	100.00	22.88	28.79	0.00	0.00	100.00	40.89	$P=0.285$
Social limitation	T0	23.33	0.00	16.66	88.88	24.95	26.14	0.00	22.22	77.77	25.13	$P=0.684$
	T1	11.11	0.00	0.00	77.77	25.61	25.49	0.00	22.22	100.00	29.07	$P=0.029$
	T2	5.32	0.00	0.00	77.77	16.50	23.23	0.00	0.00	100.00	33.87	$P=0.047$
Personal relationship	T0	21.11	0.00	11.11	100.00	26.64	40.19	0.00	33.33	100.00	35.38	$P=0.059$
	T1	5.55	0.00	0.00	33.33	11.78	21.57	0.00	0.00	100.00	32.68	$P=0.127$
	T2	2.78	0.00	0.00	33.33	8.02	6.67	0.00	0.00	66.66	21.08	$P=0.919$
Emotion	T0	40.44	0.00	33.33	100.00	33.00	59.47	11.11	55.55	100.00	31.17	$P=0.067$
	T1	17.33	0.00	0.00	77.77	26.66	38.56	0.00	11.11	100.00	41.04	$P=0.046$
	T2	9.72	0.00	0.00	77.77	22.05	30.3	0.00	11.11	100.00	37.21	$P=0.101$
Sleep/energy	T0	35.33	0.00	33.33	83.33	30.17	28.43	0.00	16.66	83.33	29.32	$P=0.380$
	T1	13.33	0.00	0.00	50.00	16.67	15.68	0.00	0.00	83.33	26.00	$P=0.788$
	T2	6.94	0.00	0.00	50.00	12.92	9.09	0.00	0.00	66.66	21.55	$P=0.677$
Severity measures	T0	53.40	13.33	53.33	100.00	22.35	59.6	20.00	66.66	100.00	26.19	$P=0.297$
	T1	20.53	0.00	13.33	73.33	20.81	39.08	0.00	20.00	93.33	35.92	$P=0.151$
	T2	11.66	0.00	6.66	33.33	12.00	31.51	0.00	33.33	100.00	39.67	$P=0.521$
Symptoms	T0	1.44	0.00	1.00	3.00	1.12	1.00	0.00	1.00	3.00	1.12	$P=0.197$
	T1	0.84	0.00	1.00	3.00	1.03	0.88	0.00	0.00	3.00	1.11	$P=0.989$
	T2	0.60	0.00	1.00	3.00	0.87	0.64	0.00	0.00	3.00	1.03	$P=0.937$

Fig. 6. Picture of a patient before and after GPR treatment.

PFMT is an efficient technique that, if well applied, improves significantly the symptoms of SUI. However, patients need to be aware of the importance of the adherence to treatment and that exercises must be continued for life [30]. This study demonstrated a dropout rate of 34.6% in G2 before the end of treatment. The main reason for discontinuity has been difficulty in performing the exercises and lack of interest. The great challenge for patients was to keep practising the exercises, to maintain the results. The PFMT program is monotonous, whatever the protocol adopted. In this study, all patients received individual treatment, with weekly contact with the physiotherapist. However, as this is a work of bodybuilding, there is a need for additional work at home, in addition to joining the program for life, to guarantee the results. The GPR group received treatment for the correction of postural imbalances, which resulted in improved overall performance of the muscles. It was characterized by a treatment with a beginning, a middle and an end and the patients were only instructed on postural habits, which promotes adherence to treatment. No dropouts occurred in G1.

Evidence for the need for maintaining PFMT is well demonstrated by the fact that four patients in G2 who achieved improvement of SUI symptoms at the end of treatment but did not maintain exercises, reported recurrence of SUI at six-month follow-up. On the other hand, three patients in G2 who improved at T1 and maintained the PFMT program reported cure at T2. It is interesting to comment that some patients with good FEPF results (degrees 4 or 5) still presented SUI symptoms. It is hypothesized that the pelvic muscles could enhance its strength without improvement of its function.

In this study, two important instruments of conservative management, non-invasive and with no side effects, were considered. Patients treated with GPR demonstrated promising results through the evaluation instruments applied. GPR has the advantage of working globally, bringing benefits in other aspects of the patient's quality of life and probably with longer lasting results. It must be considered that the small sample size in the study could have led to a non-significant difference in some of the parameters analyzed.

This was the first study aiming to consider GPR for the treatment of SUI. More randomized control trials are necessary to support the findings of this first controlled study. This study continues with the follow-up of patients two years after the end of treatment and the results will be presented in a new article.

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