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Urinary incontinence and prostate cancer: A rehabilitation program design

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A B S T R A C T

Introduction and objectives: This article presents the design and implementation of a rehabilitation program based on the muscular exercises of the pelvic floor, incorporating the strength resistance work.

Materials and methods: The design is quasi-experimental. The sample is formed by 33 participants in treatment phase. The variables studied are: anthropometrics variables, variables related to UI evolution (intensity, difficulty, frequency and activities limitation), obesity, fatigue and pain, muscular strength and quality of life. Measures pre (0 week) and post test (24 weeks) are taken with the aim of evaluating intra-subject change. Statistic analysis is made with the Student-fisher test, Wilcoxon or U Man Whitney, and $\chi 2$ test. Analysis was performed with SPSS program version 15. Signification level chosen was 5%.

Results: After 24 weeks of program an improvement was identified in: anthropometric variables waist-to-hip ratio (p=,003), waist perimeter (p=,001), body fat percentage (p=,001), IU intensity (p=,0001), frequency and difficulty and the relation with activities limitation (p=,0001), and also the existing relationship between the improvement of IU and the improvement of QoL (p=,039).

Conclusions: The article establishes scientifically the efficacy of the progressive strength to diminish IU. The improvement of QoL of men with prostate cancer is mediated by the improvement of the urinary continence.

La incontinencia urinaria en el cáncer de próstata: diseño de un programa de rehabilitación

Palabras clave:
Incontinencia
Ejercicio

R E S U M E N

Introducción y objetivo: Este trabajo presenta el diseño e implementación de un programa progresivo de rehabilitación basado en los ejercicios musculares del suelo pélvico, incorporando el trabajo muscular de fuerza contrarresistencia.

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Cáncer de próstata
Calidad de vida

Material y método: El diseño del estudio es casi experimental. La muestra es de 33 participantes en fase de tratamiento. Las variables de estudio son las antropométricas, las relacionadas con la evolución de la incontinencia urinaria (IU) (intensidad, dificultad, frecuencia y limitación de las actividades), la obesidad, fatiga y dolor, la fuerza muscular y la calidad de vida (CdV). Para evaluar el cambio intrasujeto se tomaron medidas pretest (semana 0) y postest (semana 24). En el análisis estadístico se utilizan las pruebas t Student-Fisher, Wilcoxon o U de Mann Whitney y el test del χ^2. El análisis se realiza con el programa SPSS versión 15. El nivel de significación escogido es del 5%.
Resultados: Al finalizar las 24 semanas del programa se identifica una disminución significativa de las variables antropométricas índice de cintura-cadera (p = 0,003), perímetro de cintura (p = 0,001) y porcentaje de masa de grasa (p = 0,001); de las variables de IU: intensidad (p = 0,0001), frecuencia y dificultad y su relación con la limitación de las actividades (p = 0,0001), así como la relación existente entre la mejora de IU y la mejora de la CdV (p = 0,039).
Conclusiones: Queda científicamente demostrada la eficacia del programa progresivo de fuerza para disminuir la IU. La mejora de la CdV del hombre mayor con cáncer de próstata viene mediada por la mejora de la continencia urinaria.

Introduction

Urinary incontinence (UI) is defined as an objective involuntary leakage of urine that causes a social and hygiene problem in the patient. The defining factors of UI are type, frequency, severity, and psychosocial impact[1]. UI adversely affects the patient's quality of life (QoL) in the physical, functional, and psychosocial spheres. UI in the elderly increases the risk of institutionalization. Although the main risk factors for UI in both genders are age and functional dependency, many studies focus on female UI[2]. The number of articles studying UI in the elderly, especially males, is significantly smaller; however, an apparent reversal of this trend has been observed in the past few years[3,4].

Pelvic floor rehabilitation plus behavioral therapy are the first-choice conservative treatment of incontinence[5]. They constitute a natural, inexpensive, and comparatively effective method with no side effects with the purpose of strengthening the hypotonic and weakened striated muscles of the pelvic floor, increasing pelvic balance, improving local vascularization and the anorectal function, and achieving a satisfactory sex life[6]. Study results show that pelvic floor muscle training (PFMT) improves or resolves the UI symptoms compared to conventional treatment; however, the magnitude of the improvement cannot be determined[7].

The efficacy of PFMT depends on adherence to the program, and it is essential that patients follow a routine and independent practice[8]. The promotion and assessment of adherence involve the evaluation of significant variables that correlate with the behavior (PFMT) and any additional support necessary for autonomous learning. Working with these characteristics makes it possible for patients to develop a routine and autonomous practice.

UI and sexual impotence are the secondary symptoms more often associated with prostate cancer and its treatment. These symptoms act in an interrelated and interactive manner, causing a major generalized problem[9].

The types and characteristics of UI secondary to prostate cancer are stress UI, which is associated with prostatectomy; urge incontinence, which is associated with radiation therapy, consists of a strong and sudden urge to urinate, with burning sensation or irritation in the bladder[10]; and mixed incontinence, which affects older patients on radiation and/or hormone therapy[11].

In addition to the functional problem, UI causes a psychosocial disorder characterized by distress that is augmented by the inability to perform habitual activities, the impossibility of controlling leakage and the resulting feeling of regression, and the inability to overcome the fatigue resulting from the interruption in the number of hours and the quality of sleep in the case of nocturia. A restrictive social situation is usually observed, characterized by shyness, shame from the leakage, and social stigmatization. Additionally, incontinence may trigger a psychological obsessive behavior around the control of leakage and odors[12]. These factors cause a reduction of the patient's social network and in extreme cases, a *sensation* of social isolation[13].

The impact of UI on the QoL of the prostate cancer patient is determined by the self-perception of the severity and the disruption of daily activities caused by the symptom. A significant improvement of the symptom interacts with several aspects of the patient's QoL[14].

The number of cases of UI and sexual impotence recorded in clinics is much higher than the number described in medical urological studies[10]. This discrepancy is attributed to the great variability of definitions, measurement instruments, and manners of assessing UI. Also, it is difficult to determine

whether the symptom is a result of the disease or of the natural involution that occurs with age. Finally, there is a fatalistic and resigned attitude that makes the patients hide or mask the symptom from the specialist[15,16]. Based on these data, we suggest that UI is underdiagnosed and undertreated; for this reason, the World Health Organization recommends exploring the reasons that determine this behavior and the percentage of the population that do not request urological care.

The objective of this study is to share the design and implementation of a progressive rehabilitation program based on strength against resistance adapted to prostate cancer patients in the treatment phase (including prostatectomy, hormone, and radiation therapy) with the purpose of reducing the UI symptom and improving the QoL. In order to achieve this objective, we have attempted to overcome the methodological limitations of study review and analysis. These limitations include: not taking into account more disadvantaged groups such as elderly ill individuals, the lack of specificity of the characteristics of the intervention, not including the rehabilitation time, an insufficient duration of the intervention, the absence of assessment and typification of the incontinence, the use of a multimodal program intervention, the discrepancy between the actual and the planned working parameters, the absence of analysis of adherence with the program, assessment variables focused only on functional aspects without considering the patient's QoL, and the absence of analysis of long-term outcomes.

Material and methods

The study design is quasi-experimental. Data collection is based on a 24-week progressive strength program. The program is described later.

Subjects were selected randomly among patients in the treatment phase according to their medical record number using the SPSS v.15 package. The sample size calculated to detect a 5.0-point difference between groups is the result of the Functional Assessment Cancer Therapy Scale-Prostate (FACT-P) test (standard deviation [SD]: 9). A two-tailed test with an α risk of 5% and a β risk of 5% was applied. The result indicated 33 as the minimum required sample size. The urology service provided 36 subjects, three of whom withdrew due to cognitive problems, metastatic bone pain, and heart failure. The final sample is constituted by 33 subjects. The training program was conducted at the Hospital de Figueres from October 2006 to October 2007, and had been previously approved by the research ethics committee.

Three conditions were necessary for subjects to be included in the program:

- Histopathological diagnosis of prostate cancer at any stage and in treatment phase.
- Passing the pre-intervention medical examination stating that the patient did not have any contraindication incompatible with the program.
- Subject's signing of the informed consent.

The exclusion criteria were severe UI episodes before diagnosis, and an inability to understand or speak Spanish.

The design of the progressive rehabilitation program is based on the PFMT guidelines. The implementation of the program consists of three linked consecutive levels based on the recognition, control, and tonifying of the pelvic floor musculature. The program is based on strength capacity and is conducted in a group, as this is the most effective way to share the symptom's negative effects for the individual and the couple, improve vigor and body image, and potentiate a network of social interaction[17,18].

The objectives of each level that guide the selection of specific exercises are listed below. It is essential to maintain the order of the levels and their linked character in order to attain an additive effect; this means that each level includes the previous one, otherwise undesired effects (leakage) may ensue.

Level 1. Overall posture re-education. This includes a double objective. The first is to work on an overall vertical balanced posture associated with a respiratory rhythm. This objective implies aligning the body on the medial axis on a stable base of support, integrating the spine with the pelvis, and associating effective abdomino-diaphragmatic respiratory biomechanics. The second objective is to attain overall and segmental relaxation with a relaxation technique (Jacobson's technique), in order to achieve a more eutonic muscle state. Level 1 includes exercises for verticality, backward displacement of the center of gravity, balanced tonic postural activity, interiorization of the medial axis, and abdomino-diaphragmatic breathing. This level improves awareness of the muscle tone in the body and the pelvic region, and also improves body image, breathing perception, and general well-being.

Level 2. PFMT. The objective of the intervention is to re-train the UI by improving the active retention strength of the striated muscles of the pelvic floor in order to overcome the insufficiency of the injured sphincters and improve the continence of men with prostate cancer[19]. This level includes the awareness of the pelvic floor musculature and the coordination of the contraction-relaxation process (biofeedback) to improve the control and the quality of the muscle contraction. Specific attention is given to the muscles of the deep plane of the pelvic floor, especially the levator ani muscle[20]. Postural progression to automate the effective contraction goes from the supine position (hip flexion and abduction with the soles of the feet facing each other) to sitting, standing, and finally walking and integrating daily life activities.

This general objective includes four specific goals:

- To recognize the area to rehabilitate through propioceptive tasks. This is accomplished with sensory and perception exercises of the central nucleus of the perineum through direct (manual) or indirect (ball) contact. The propioceptive work facilitates the recognition of the area, allows to differentiate the muscle tonic dialog (contraction vs. relaxation), and makes the area more flexible.
- To dissociate the healthy surrounding musculature. This is achieved with exercises designed to segregate the

activity of the parasitic musculature surrounding the pelvic floor that acts synergistically during contraction. The main muscles to be isolated are: abdominal, adductor, gluteus, and psoas. Additionally, the musculature of the deep plane of the pelvic floor, the levator ani, must be distinguished from that of the superficial plane. This activity facilitates later analytical work to reinforce the pelvic floor musculature.

- To achieve effective muscle contraction. The automatic contraction biofeedback circuit allows to recover the fitness of the muscle fibers. This is why two types of isolated or combined contractions are required.
  a. Recovery of fast twitch muscle fibers. Reactive contraction, intense and of short duration (=1s), essential to recover from stress UI.
  b. Recovery of slow twitch fibers. Moderate or low intensity, maintained contraction (5s). This kind of contraction improves muscle resistance to counteract the fatigue of the sphincter.
- In this exercise there usually is contraction of parasitic muscles as a compensatory response to the fatigue of the weakened musculature. This effect should be eliminated because it diminishes the intensity and quality of the contraction of the target musculature and reduces the efficacy of the exercise.
- To restore coordinated muscle synergy. The previously isolated synergistic musculature must be reintegrated because it intervenes naturally in the contraction of the pelvic floor. Abdominal tone is essential for the proper orientation of pressure on the pelvic floor; however, it is important that it does not act as the main engine, but synergistically, with the pelvic floor musculature.

Level 3. Irradiated muscle strength against resistance exercises. This is an original and newly included level. The objective is to create a hypertrophy of the pelvic floor musculature through the contraction of the healthy musculature of the pelvic floor. The rationale for this exercise is the interactive network of kinetic muscle chains[17]. When the healthy counter-resistance musculature proximal to the medial axis and away from the pelvic floor is activated, there is an overflow of energy that allows the activation and contraction of the target musculature in the pelvic floor in a coordinated manner with the rest of the muscles associated with the kinetic chain. The energy overflow is a safe and effective way to achieve muscle hypertrophy.

The following characteristics should be considered for implementation: the duration is 24 weeks (16 weeks of direct monitoring by the rehabilitation professional, and 8 weeks of independent work); the frequency is two 60-minute sessions per week; of the 16 weeks of supervised exercise, two weeks are at level 1, four weeks at levels 1 and 2, and the remaining ten weeks are exercises at levels 1, 2, and 3. Level 3 consists of two series of 8 to 12 repetitions of four correlative exercises for the quadriceps, pectoral, ischiotibial, and abdominal muscles (hypopressive); the intensity is of 50-70% of the 8 maximum repetitions previously calculated with Lander's test[21]. In order to avoid testosterone secretion, a risk factor for prostate cancer progression, it is strictly mandatory not to exceed the 70% threshold of 8 MR. Additionally, an assessment of the individual's perception of the intensity of the controlled effort is included, based on the modified Borg Perceived Exertion CR10 scale[22].

Direct variables should be distinguished from covariables. A pretest diagnosis of the type of UI (stress, urge, or mixed) is reached through the clinical history, based on the validated UI-4 test. The variables leakage intensity and frequency are determined with the Sandvik scale. Volume is assessed with the 20-minute pad test that correlates with the 1-hour test recommended by the International Continence Society[22]. Nocturia is defined as needing to get up twice or more. The visual-analogue scale for UI (VAS-UI) and the five UI symptom questions of the QoL questionnaire of the Functional Assessment of Cancer Therapy Scale- Prostate [FACT-P] were used to collect the data. These results were triangulated with the urodynamic results from a prior medical assessment at the urology service. QoL was assessed using FACT-P (range: 0-156) (version 4). Fatigue was assessed using the fatigue scale (version 4) (range: 0-52).

The sociodemographic questionnaire, the anthropometric assessment, blood pressure, treatment toxicity, and exercise habits prior to PFMT assessed with the modified Godin questionnaire[23] were also applied. The 8 MR calculation was done with the trunk and lower extremities strength-resistance using the ASEP protocol[24]. The QoL questionnaire was self-administered. The AAPHERD[25] protocol was followed to record the anthropometric variables. The same variables, except for the sociodemographic questionnaire, were assessed in the week 24 post-test.

As covariables, the integrated adherence model that includes variables determined by some studies to correlate with maintaining the PFMT practice was assessed. This model encourages autonomy by transferring control of PFMT from the supervisor to the subject. Contingent support during the program allows the reinforcement of the most weakened variables. The modified Godin questionnaire was used to assess the outcomes of the integrated model variables[23].

Student's t-test and Fisher tests were used for the statistical analysis of paired data for continuous variables with a normal distribution and a degree of freedom n-1. Continuous variables that do not follow a normal distribution were analyzed using the non-parametric Wilcoxon or Mann-Whitney U test for paired data. Categorical variables were analyzed with the χ^2 test. The SPSS package version 15 was used to perform the statistical analyses. The level of significance chosen was 5%.

Results

The Results section is organized according to the subjects' clinical and epidemiological characteristics; the symptoms variable is shown below (table 1).

1. *Clinical history*

UI was diagnosed in 22 of the 33 subjects (66.66%).

- Eleven had stress incontinence (33.33% of the sample) resulting from surgery.
- Five had urge incontinence or urinary urgency (15.15% of the sample) resulting from the three types of treatment.
- Six had mixed incontinence (18.18%) resulting from the three types of treatment.

The remaining 11 subjects (33.33%) were not diagnosed with incontinence but presented with lower urinary tract symptoms (LUTS) of sporadic episodes of urine leakage following a mixed incontinence pattern. This set of 11 subjects included 9 cases (27.27%) with nocturia.

Table 1 – Subjects' clinical and epidemiological characteristics

Variable	Intervention group (n=33)
Age (years)	
$\bar{x}$ (SD)	71.78 (7.22)
Weight (kg)	
$\bar{x}$ (SD)	80.40 (11.60)
BMI (kg/m^2)	
$\bar{x}$ (SD)	28.67 (2.99)
Blood pressure (mmHg)	
SBP, $\bar{x}$ (SD)	150.25 (21.31)
DBP, $\bar{x}$ (SD)	81.90 (11.03)
Resting heart rate (beats/minute)	
$\bar{x}$ (SD)	74 (10.74)
TNM classification (%)	
Stage I	0 (0)
Stage II	13 (39.39)
Stage III	18 (54.54)
Stage IV	1 (3.03)
Unknown	1 (3.03)
Diagnostic PSA (ng/mL)	
$\bar{x}$ (SD)	17.95 (24.32)
PSA at start of program (ng/mL)	
$\bar{x}$ (SD)	0.55 (1.36)
Treatment, n (%)	
Surgical (P)	15 (45.45)
Hormonal (ADT)	15 (45.45)
Combined	
R+ADT	1 (3.03)
P+ADT	2 (6.06)
Sociodemographic questionnaire, n (%)	
Marital status	
Married	30 (90.90)
Widower	2 (6.06)
Single	1 (3.03)
Employment status, n (%)	
Retired	31 (93.93)
Employed	2 (6.06)
Prior PFMT, n (%),	
Times per week	0 (0)

SD: standard deviation; PFMT: pelvic floor muscle training; BMI: body mass index; P: prostatectomy; DBP: diastolic blood pressure; SBP: systolic blood pressure; PSA: prostate-specific antigen; P+ADT: prostatectomy plus androgen deprivation therapy; R+ADT: radiotherapy plus androgen deprivation therapy; ADT: androgen deprivation therapy.

2. *Anthropometric variables*

At the end of the program, significant decreases in the means and standard deviation of the hip-to-waist index, the waist perimeter, and fat percentage were observed (table 2).

3. *Progression of the urinary incontinence*

3.1. *Intensity of the urinary incontinence*

The variable intensity of the UI recorded with the VAS-UI decreased from a mean 3.79 (2.54) before the program to 1.03 (0.918) after the program; the 2.75 (1.88) difference in means is significant (p=0.0001).

3.2. *Difficulty, frequency, and limitation of activities*

Table 3 shows a significant reduction in the four variables assessed: constipation, difficulty, frequency, and limitation of activities. Furthermore, there was a significant decrease of nocturia (table 3).

4. *Relationship between urinary incontinence and obesity*

The difference between the VAS-UI before and after the program was calculated. The variable obesity was classified according to the waist perimeter-hip perimeter ratio. Two categories were drawn: Category 1: not obese, with a ratio equal to or less than 1; Category 2: obese, with a ratio exceeding 1. The variable obesity was compared with the variable UI. In both pre-test and post-test, the mean VAS-UI among the non-obese subgroup was lower than among the obese subgroup. Furthermore, the number of subjects in the obese subgroup decreased by 4 in the post-test period, which means that the PFMT program has an effect on the centripetal obesity variable (table 4). The result is not significant, but has a tendency towards significance (table 4).

5. *Fatigue and pain symptoms*

Table 5 shows the changes observed in the fatigue questionnaire and the numeric VAS for pain (VAS-pain). At post-test there was a non-significant decrease of 2.99 points in fatigue, and a significant decrease of 1.90 points in pain intensity (table 5).

6. *Muscle strength* (table 6)

7. *Relationship between urinary incontinence and quality of life*

7.1. *Changes in quality of life (FACT-P) associated with the urinary incontinence symptom*

The difference in the pre- and post-treatment QoL questionnaire (FACTP-dif.) results were calculated. Subjects with the UI symptom show a mean improvement of 12.94 points (7.79) in the questionnaire, while subjects with LUTS have a mean improvement of 2.28 points (11.01). The results are not significant, but have a tendency towards significance.

7.2. *Changes in quality of life (FACT-P) associated with an improvement in urinary incontinence*

The difference between the VAS-UI before and after the program was calculated. The variable was classified in two groups: the first group was that with less improvement in UI, and the second group had more improvement in UI. The QoL variable (FACT-P) was compared with the UI variable. The mean FACT-P questionnaire result of 14.75 (16.50) in the group with more UI improvement is higher than the mean 2.95 (14.58) for patients with a smaller improvement in UI. This difference is statistically significant (t=-2.15; p=0.039).

Table 2 – Anthropometric variables

Parameter			Pre-test	Post-test	Pre-test-Post-test[a]	
Variable		n	$\bar{x}$ (SD)	$\bar{x}$ (SD)	$\bar{x}$ (SD)	p*
WHI		33	1.01 (0.05)	0.99 (0.05)	0.02 (0.03)	0.003*
WP		33	104.46 (8.68)	101.90 (8.97)	2.56 (2.49)	≤0.001*
FM-7 (%)		33	40.87 (15.18)	28.96 (11.42)	11.90 (10.59)	≤0.001*

SD: standard deviation; WHI: waist-hip index; FM-7 (%): fat mass percentage; WP: waist perimeter.
[a]Changes observed after 16 weeks on the intervention program.
*p: significance value (p<0.05).

Table 3 – Variables difficulty, frequency, and limitation of activities

Parameter			Pre-test	Post-test	Pre-test-Post-test[a]	
Item	Range	n	$\bar{x}$ (SD)	$\bar{x}$ (SD)	$\bar{x}$ (SD)	p*
1	[0-4]	33	0.52 (1.06)	0.27 (0.62)	0.24 (0.61)	0.030*
2	[0-4]	33	0.79 (1.21)	0.42 (0.66)	0.36 (0.89)	0.026*
3	[0-4]	33	1.48 (1.27)	0.70 (0.84)	0.78 (0.99)	0.000*
4	[0-4]	33	0.97 (1.38)	0.25 (0.57)	0.72 (1.14)	0.001*
Nocturia		33	1.60 (1.10)	0.78 (0.53)	0.81 (0.69)	0.000*

SD: standard deviation.
Wilcoxon non-parametric test.
Items. 1: I have trouble with constipation; 2: I have urinary difficulties; 3: I urinate more often than usual; 4: My urinary problems limit my activities.
[a]Changes observed after 16 weeks on the intervention program.
*p: significance value (p<0.05).

Table 4 – Variables urinary incontinence and obesity

Parameter			Associated differences	t-test for equal medians	
Questionnaire	Obesity	n	$\bar{x}$ (SD)	t	p*
Baseline VAS-UI	1	17	0.82 (0.97)	–1.35	0.52
	2	16	1.25 (0.83)		
Final VAS-UI	1	21	0.95 (0.95)	–6.39	0.052
	2	12	1.16 (1.16)		

SD: standard deviation; VAS-UI: visual-analogue scale for urinary incontinence.

Table 5 – Variables fatigue and pain

Parameter			Pre-test	Post-test	Associated differences[a]	
Questionnaire	Range	n	$\bar{x}$ (SD)	$\bar{x}$ (SD)	$\bar{x}$ (SD)	p*
FACIT	0-52	33	39.91 (9.72)	42.90 (6.60)	2.99 (10.46)	0.110
VAS-pain	0-10	33	4.57 (n/a)	2.66 (n/a)	1.90 (1.25)	≤0.001

SD: standard deviation; VAS-pain: visual analogue scale for pain; FACIT: Fatigue questionnaire; n/a: not applicable.
[a]Changes observed after 16 weeks on the intervention program.
*p: significance value (p<0.05).

Table 6 – Variables muscle resistance and submaximum strength (8 MR)

Parameter					Pre-test	Post-test	Pre-test-Post-test[a]	
Variable	Group	Range		n	$\bar{x}$ (SD)	$\bar{x}$ (SD)	$\bar{x}$ (SD)	p*
		Pre-test	Post-test					
Rmusc	Pec	[2-23]	[7-42]	31	12.83 (5.20)	20.25 (7.87)	7.41 (6.97)	<0.001*
	LE	[8-50]	[10-90]	32	19.43 (9.49)	31.37 (18.12)	11.93 (18.87)	<0.001*
8 MR	Pec	[5.3-36.5]	[6.6-45.6]	32	21.66 (8.38)	26.59 (8.91)	4.93 (4.37)	<0.001*
	LE	[6.6-135.4]	[10.7-159.6]	32	57.59 (35.19)	83.79 (43.33)	26.19 (24.78)	<0.001*

8 MR: 8 maximum repetitions calculated with Lander's formula (22); SD: standard deviation; LE: lower extremities; Pec: pectoral; Rmusc: muscle resistance.
[a]Changes observed after 24 weeks on the intervention program.
*p: significance value (p<0.05). A significant improvement was observed in muscle strength-resistance and submaximum strength. The effect is more marked in the lower extremities (see table 7). Lander's formula (1985): weight lifted (kg)/[1.013-0.0267123 # of reps].

Discussion

This study shows that the progressive PFMT rehabilitation program for UI significantly improves patients' QoL. This improvement is mediated by the improvement of the UI symptom. The results show that the improvement in QoL is more marked in the subgroup of subjects with UI than in the subgroup with LUTS. There was a more marked impact on the intensity of the UI symptom variable among men with more centripetal obesity. The results demonstrate that the PFMT program has the effect of improving the functional dimension of incontinence and the physical dimension of pain. The essential and basic element of this program is to have an effect on the UI symptom, but due to its overall and holistic design, it has an effect on other symptoms and trigger factors of prostate cancer and its treatment.

The inclusion of exercises for strength against resistance irradiating from the healthy musculature of the pelvic floor improves the overall muscle fitness of the older individual. The increase in muscle resistance and submaximum strength is more marked in the lower than in the upper extremities. This outcome permits autonomy to be maintained and delays the risk of reaching the dependency threshold zone[26]. The analysis of the results of the adherence covariables indicates that the program also improves the body image disorder caused by the symptoms of gynecomastia, hair loss, and hot flashes caused by hormone therapy. Improved self-perception of body image is achieved by recovering male-identifying traits through muscle hypertrophy, vigor, and vitality after the sessions. Group work improved the capacity to socialize and to face and overcome the symptoms of cancer and its treatment, reinforcing the quality of the social network and fostering psychosocial support among a group of peers. Intra-abdominal fat deposit is a variable associated with the impact of the UI symptom. The anthropometric analysis found an excess of fat in the abdominal area. Obesity, in addition to provoking a more severe UI symptom, is also a cardiovascular risk factor that, if not reverted, causes morbidity and mortality. The results of this study show that the PFMT program with strength-resistance exercises is an effective way to improve tissue quality. The results corroborate a significant reduction in the anthropometric variables waist perimeter, waist-hip index, and fat mass percentage. This result confirms the principle of the relationship between strength and a better anthropometric profile, and more specifically, an improvement of centripetal obesity, which has an effect on the improvement of continence. Based on the analysis of the results, it would be misleading to claim that the UI reverts completely, as the symptom remains latent as a subclinical condition. Thus, awareness mechanisms favor an improvement of the UI, and control is a fundamental element to avoid leakage. If the workout is not routinely maintained, there may be risk of a relapse of the leakage with a stress or urge pattern. The program does not consider adherence only as the final product of adherence to the program, but rather takes into account the process of change. As Proshaska stated, in order to achieve a behavioral change, it is essential to consider the variables during the period of activity, for they constitute a changing dynamic in relation to behavior. If these factors are taken into consideration, we have achieved adherence in 100% of the sample. The research and the multi-disciplinary promotion of variables that correlate with adherence from the initial phase of the program have promoted independent exercising at home. Using the Godin questionnaire, we detected an improvement of the variables of perception of control and overcoming impediments that interfere with the practice; there is also better self-efficacy that is encouraged by the gradual transference of control of the activity to the subject, and finally the correct identification of the rehabilitating dose, a newly entered significant variable that should be integrated into the model. Additionally, subjects point out

that participating in a group was fundamental for both the rehabilitation of incontinence and the maintenance of the practice, a factor also identified by Perchon[27]. A barrier was clearly identified that blocks the availability of, and access to, support resources for elderly individuals who need assistance, such as complementary programs for UI rehabilitation. The user determines the need for a professional to liase between the hospital intervention and outside support programs and to decrease waiting times. Immediate care would decrease the severity of the symptom and attain results more effectively.

Conclusions

- The progressive rehabilitation strength-resistance program is an effective and innovative method to revert the UI symptom. Improvement in UI has a positive impact on the QoL of older men with prostate cancer.
- The strength workout improves the condition of the muscles in the pelvic floor, which is fundamental to revert incontinence. Additionally, the body's general muscle strength and resistance increase. This result has an effect on the decrease of the pain symptom.
- More human and economic resources should be invested in well-being and healthcare programs that promote the health of the new generation of individuals with the incontinence symptom, including the preventive phase. The multifactorial nature and the circumstances of each subject indicate that interventions should be designed to contemplate diversity.
- Pelvic floor rehabilitation units should be integrated into the urology service with the purpose of adjusting dysfunction rehabilitation guidelines in order to ensure an intervention and treatment plan that is appropriate for each particular case.

Conflict of interest

The authors state that they have no conflicts of interest.

REFERENCES

1. Abrams P, Artibani W, Cardozo L, Dmochowski R, Van Kerrebroeck P, Sand P. Reviewing the ICS 2002 terminology report: The ongoing debate. Neurourol Urodyn. 2009;28:287.
2. Berecki-Gisolf J, Begum N, Dobson AJ. Symptoms reported by women in midlife: Menopausal transition or aging? Menopause. 2009;16:1021-9.
3. Martínez Agulló E, Ruiz J, Gómez L, Ramírez M, Delgado F, Rebollo P. Prevalencia de incontinencia urinaria y vejiga hiperactiva en la población española: resultados del estudio EPICC. Actas Urol Esp. 2009;33:159-66.
4. Shamliyan TA, Wyman JF, Ping R, Wilt TJ, Kane RL. Male urinary incontinence: Prevalence, risk factors, and preventive interventions. Rev Urol. 2009;11:145-65.
5. Moore KN, Saltmarche B, Query A. Urinary incontinence. Non-surgical management by family physicians 3. Can Fam Physician. 2003;49:602-10.
6. Zahariou AG, Karamouti MV, Papaioannou PD. Pelvic floor muscle training improves sexual function of women with stress urinary incontinence. Int Urogynecol J Pelvic Floor Dysfunct. 2008;19:401-6.
7. Shamliyan TA, Kane RL, Wyman J, Wilt TJ. Systematic review: Randomized, controlled trials of non-surgical treatments for urinary incontinence in women 7. Ann Intern Med. 2008;148:459-73.
8. Berghmans B. [The role of the pelvic physical therapist] 1. Actas Urol Esp. 2006;30:110-22.
9. Kielb S, Dunn RL, Rashid MG, Murray S, Sanda MG, Montie JE, et al. Assessment of early continence recovery after radical prostatectomy: Patient reported symptoms and impairment. J Urol. 2001;166:958-61.
10. Ponholzer A, Brossner C, Struhal G, Marszalek M, Madersbacher S. Lower urinary tract symptoms, urinary incontinence, sexual function and quality of life after radical prostatectomy and external beam radiation therapy: Real life experience in Austria 59. World J Urol. 2006;24:325-30.
11. Anger JT, Rodríguez LV. Mixed incontinence: Stressing about urge. Curr Urol Rep. 2004;5:427-31.
12. Eton DT, Lepore SJ. Prostate cancer and health-related quality of life: A review of the literature. Psychooncology. 2002;11: 307-26.
13. Trask PC. Assessment of depression in cancer patients. J Natl Cancer Inst Monogr. 2004;80-92.
14. Litwin MS, Pasta DJ, Yu J, Stoddard ML, Flanders SC. Urinary function and bother after radical prostatectomy or radiation for prostate cancer: A longitudinal, multivariate quality of life analysis from the Cancer of the Prostate Strategic Urologic Research Endeavor 2. J Urol. 2000;164:1973-7.
15. Hoffman RM, Barry MJ, Stanford JL, Hamilton AS, Hunt WC, Collins MM. Health outcomes in older men with localized prostate cancer: Results from the Prostate Cancer Outcomes Study. Am J Med. 2006;119:418-25.
16. Mitteness LS, Barker JC. Stigmatizing a "normal" condition: Urinary incontinence in late life. Med Anthropol Q. 1995;9: 188-210.
17. Serdà B. Evaluación de los efectos de un programa de ejercicio físico individualizado sobre la calidad de vida, la incontinencia urinaria, la fatiga y la resistencia muscular con enfermos de cáncer de próstata. Universitat de Girona; 2009.
18. Zhang AY, Strauss GJ, Siminoff LA. Effects of combined pelvic floor muscle exercise and a support group on urinary incontinence and quality of life of postprostatectomy patients 1. Oncol Nurs Forum. 2007;34:47-53.
19. Hunter KF, Moore KN, Glazener CM. Pelvic floor muscle training to improve urinary incontinence after radical prostatectomy: A systematic review of effectiveness. BJU Int. 2007;100:1191-2.
20. Kincade JE, Dougherty MC, Busby-Whitehead J, Carlson JR, Nix WB, Kelsey DT, et al. Self-monitoring and pelvic floor muscle exercises to treat urinary incontinence. Urol Nurs. 2005;25: 353-63.
21. Lander J. Maximum based reps. NSCA Journal. 1985;60-1.
22. Machold S, Olbert PJ, Hegele A, Kleinhans G, Hofmann R, Schrader AJ. Comparison of a 20-min pad test with the 1-h pad test of the international continence society to evaluate post-prostatectomy incontinence 2. Urol Int. 2009;83:27-32.
23. Godin G, Shephard RJ. A simple method to assess exercise behaviour in the community. Can J Appl Sport Sci. 1985;10:141-6.
24. Brown E, Weir P. Accurate assessment of muscular strength and power, ASEP procedures recommendation. Journal of

Exercise Physiology-online 2004 August [accessed 10/3/2010;1-23]. Available at: http://www.asep.org/journals/JEPonline.
25. AAPHERD. The American Alliance Physical Fitness Education & Assessment Program. American Alliance for Health, Physical Education, Recreation, and Dance (AAPHERD); 1988.
26. Suh TT, Lyles KW. Osteoporosis considerations in the frail elderly. Curr Opin Rheumatol. 2003;15:481-6.
27. Perchon L, Palma P, Magna L, Dambros M. Terapia grupal de comportamiento mejora la calidad de vida en hombres post prostatectomía radical. Actas Urol Esp. 2008;32:686-90.