

Physiotherapy as a Treatment for Post-Prostatectomy Urinary Incontinence, Systematic Review

Mónica Cristina Tello Moreno¹, Lisbeth Josefina Reales Chacón², Josselyn Gabriela Bonilla Ayala¹, Fátima Pamela Mejía Ortiz¹

1. Universidad Técnica de Ambato, Ambato - Ecuador

2. Universidad Nacional de Chimborazo- Riobamba Ecuador

Email: mc.tello@uta.edu.ec

ABSTRACT

Introduction: In this systematic review, we will analyze physiotherapy as a treatment for post-prostatectomy urinary incontinence, to provide a clear vision of how this discipline can help in this problem, given that it is a frequent sequelae in men after surgery, which alters significantly the quality of life.

Methods: A search for experimental studies was carried out in the PubMed, ScienceDirect, Scielo and Scopus databases. After applying the inclusion and exclusion criteria, 12 articles that focused on physiotherapy treatment for post-prostatectomy urinary incontinence were selected, and data were then extracted for review.

Results: The selected articles cover various training techniques for the pelvic floor muscles with a significant impact on urinary continence. This exercise, added to other treatments such as acupuncture, feedback and global training with the diaphragm and abdomen, enhance its effectiveness. These results were reflected in the reduction in the use of urinary protectors and the improvement in quality of life. In addition, time is a crucial factor to achieve continence; studies show effectiveness the longer the training is performed and whether it is performed before and after surgery.

Conclusion: There is scientific evidence that demonstrates that pelvic floor muscle training exercises as a physiotherapy treatment performed before and after radical prostatectomy allows the recovery of continence, improves quality of life and reduces the use of diapers.

KEYWORDS: Prostatectomy, urinary incontinence, pelvic floor, exercise therapy

1. Introduction

Physiotherapy is a non-invasive and non-pharmacological treatment modality well known for its role in diagnosing, preventing and treating symptoms of multiple ailments, both acute and chronic, especially in the field of trauma injuries (tears, sprains, fractures, among others) and/or neurological injuries (cerebral palsy,

hemiplegia, etc.)⁽¹⁾, but there is the specialty of pelvic physiotherapy that is still little known to both doctors and patients. Pelvic physiotherapy treats women, men and children who have symptoms such as pelvic pain, erectile dysfunction, urinary incontinence, organ descent, among others⁽²⁾.

The human body is a complex machine, and any surgery has the potential to upset its delicate balance, prostatectomy is an intervention that involves the total or partial removal of the prostate, a walnut-sized organ located below a man's bladder. This surgery is usually performed to treat prostate cancer⁽³⁾. However, a common side effect is urinary incontinence, the cause of incontinence is the result of urethral sphincter deficiency or laxity and the destruction of support mechanisms by surgery⁽⁴⁾. The level of prostate removal, with or without preservation of the neurovascular bundles, causes dysfunctions such as detrusor hyperactivity, altered bladder sensation, erectile dysfunction and low bladder compliance, leading to the weakening of the pelvic support muscles⁽⁵⁾.

This can be a short-lived condition, but in many cases, men may continue to experience incontinence for months, or even years, after surgery, an issue that is often overlooked in general health conversations, but can have a significant impact on the quality of life of those who suffer from it ⁽⁵⁾.

This is where pelvic physiotherapy comes into play, contributing to the resolution of these sequelae. It does this by strengthening the pelvic floor muscles, which are critical for urinary control. Physical therapists can teach men specific exercises to strengthen these muscles, over time, these exercises can help reduce, or even eliminate, the symptoms of urinary incontinence.

The treatment of urinary incontinence through physiotherapy not only has a physical impact, but can also improve the quality of life of patients, by reducing incontinence they can resume daily and social activities without the fear or anxiety of urinary accidents, which can have a significant effect on their emotional and psychological well-being⁽⁶⁾.

The objective of this systematic review is to search for articles that address physiotherapy as a treatment for post-prostatectomy urinary incontinence, to provide a clear vision of how physiotherapy can help in this problem, to compare the efficacy of pelvic floor exercises versus other types of intervention to treat post-prostatectomy urinary incontinence and to analyse how the time of physiotherapy is to be started (preoperative vs. postoperative) affects treatment efficiency.

2. Methodology

Materials and Methods

Study Type and Design

This study is based on a systematic review, for which information on physiotherapeutic techniques applied in patients before and after radical prostatectomy was analyzed, and which were published in the last 5 years to ensure that the information was current. This review includes information sources in

English, Portuguese, French and Spanish.

Search strategy

The databases selected for data collection were PubMed, ScienceDirect, Scielo and Scopus. Keywords used in the search included 'prostatectomy', 'physiotherapy', 'urinary incontinence' and 'post-prostatectomy'. Boolean operators such as OR, NOT, and AND were used to identify physiotherapy-related articles in the context of prostatectomy. The search was carried out from October 25 to November 6, 2023 in the different sources.

Selection criteria

We included randomised clinical trials, randomised controlled trials (RCTs), prospective randomised studies and retrospective studies that discuss physiotherapy as a treatment in radical prostatectomy, with full text free, studies with an experimental group and a control group and use quantitative measurements for comparison.

Exclusion criteria included studies that discuss medical treatment, post-prostatectomy erectile dysfunction treatment, or treatments not related to physiotherapy (e.g. nursing or nutrition care); studies with the nature of a systematic review.

After searching the aforementioned databases, a total of 70 articles were identified. After a review and applying the inclusion criteria, 12 articles were selected for incorporation and analysis in this systematic review.

The results were recorded following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) model⁽⁷⁾ (Figure 1).

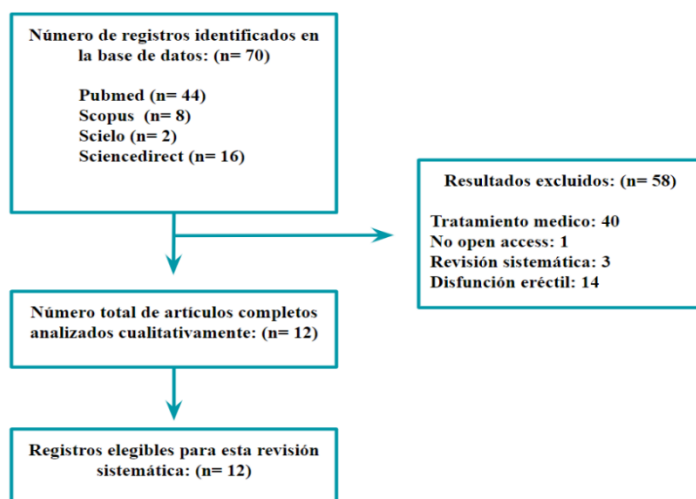


Figure 1. Search strategy. In original language Spanish

Assessment of methodological quality

In this study, the PEDro Evidence Scale (Physiotherapy Evidence Database) was used. This scale consists of 11 criteria used to evaluate the methodological quality of a clinical study. These criteria address aspects related to the design of the study, the quality of the information presented and the validity of the results⁽⁸⁾.

The Newcastle-Ottawa Scale (NOS) is used to assess the methodological quality of non-randomised studies, whether case-control or cohort studies. This scale is widely used in medical research to determine the quality of retrospective studies and the validity of the results they present. The evaluation is based on three main categories: selection of study groups, comparability of groups, and outcomes. A study with a higher score is considered to be of higher methodological quality and has a lower risk of bias⁽⁹⁾.

3. Results

Classification and representation of articles

Each selected study provided the following data: author's name, year of publication, type of study, sample size, evaluation method, protocol and results. (Table 1).

Table 1. Information on the items included	
Author and year	Characteristics of the articles
Milios et al. 2019 ⁽¹⁰⁾	Study type: Randomized trial Patients: 97 men with GC (47) and GI (50) Pre-surgical intervention: GC: 3 sets of PFM exercises daily once a day, with 10 contractions: (hold 10 s - rest 10 s), supine, sitting and then standing. GI: 6 sets of PFM exercises per day, 10 fast contractions (1 s duration) and 10 slow contractions (10 s duration) with an equal rest time, providing a total of 120 contractions per day. All sets were performed in standing posture for this group. Post-surgical intervention: Postoperative PFM training resumed after catheter removal. Members of the control group performed 3 sets per day of the same exercises they performed before surgery, while members of the intervention group continued their exercise regimen with 6 sets per day of fast- and slow-twitch training. Sessions: Both interventions began 5 weeks before surgery and continued for 12 weeks after RP. Instruments: 24-hour pad weights Participants were assessed preoperatively and at 2, 6, and 12 weeks postoperatively. Results: GC demonstrated a slower return to continence and experienced significantly more leakage (p <0.05), measured by the weight of the 24-h pad, compared to the GI, suggesting an impact of the rehabilitation protocol.
Lira et al. 2019 ⁽¹¹⁾	Study Type: Randomized Clinical Trial Patients: 31 men were chosen as CG (15) and IG (16) Intervention: CG: Usual care after radical prostatectomy (RP). GI: Preoperative pelvic floor muscle training (PFMT) physical therapy (included exercises and electromyographic biofeedback) and resumed immediately after urethral catheter removal. Sessions: GI 2 Sessions 3 times a day at progressive higher intensities. Instruments: Complete medical history and physical examination. Erectile Function Index Questionnaire (IIEF-5), electromyographic recordings of the pelvic floor (with Miotool Uro device) at rest, during rapid and sustained contraction of the pelvic floor. Results: The protocol used did not significantly improve continence rates (P > 0.05) or erectile function (P = 0.745) in an early assessment at 3 months after RP.
Zachovajeviene et al.	Study Type: Prospective randomized trial

2019 ⁽¹²⁾	Patients: 147 men, 143 of whom were intended to be treated. 48 in PFMT, 48 in diaphragm muscle training (DMT) and 47 in abdominal muscle training (AMT). Intervention: PFMT: The exercises were performed in various positions, the activation of the PFM consisted of short dynamic contractions, gradually increasing the repetitions. PFM contraction was performed in concave pelvic floor. DMT: They were performed in various positions, using strong and hard concentric and eccentric contractions of the diaphragm with resistance, giving them indications on how to activate the diaphragm. AMT: The correct activation of the abdominal muscles was taught, with movements of the lower limbs with a concentric contraction regime. For the transverse abdominis activation exercises, it was performed in different positions. Sessions: PFMT: PFM activation, 2-3 sets in 1 session and 1-minute rest. Contraction of PFM 2 times a day for 30 min. DMT: 2 sets of 6 to 8 repetitions with a 1-minute rest 2 times a day for 30 minutes. Gradually increasing the intensity. AMT: 2 times a day for 30 minutes. Instruments: Medical history, physical examination, PFMS and PFME (performed using a perineometer "Peritron 9300 A"), UI was assessed with the 8-hour compress test (during visits of 1, 3 and 6 months). Results: An increase in PFMS and the ability to maintain PFME was observed in all groups compared to baseline values ($p < 0.001$). The training group showed greater improvement in PFME. In the DMT group, a strong correlation was found between UI, PFME ($r = -0.61$) and PFMS ($r = -0.89$). All training programs significantly reduced UI after RP.
García-Sánchez et al. 2022 ⁽¹³⁾	Study Type: Randomized Clinical Trial Patients: 62 men, 31 GI and 31 CG. Intervention: The 2 groups performed the exercises during the waiting list until the intervention and restarted them after removing the bladder catheter. GI: PFM physiotherapist-guided exercises, slow contractions 3s contractions and 6s relaxation (progressive increase 5s and 10s respectively) and rapid contractions. GC: The exercises were explained in a writing written by a physiotherapist to be done at home. Sessions: GI: 3 sessions, 3 sets of 10 repetitions of slow contractions and 3 fast contractions. Instruments: 24-hour pad test with a 3-day urination diary, ICIQ-SF, SF-36, KHQ. Results: Between the CG (51%) and the IG (39%) no significant differences were found in the effectiveness of the treatment, with UI in the CG (86%) and in the IG (83%). In the "role limitation due to emotional problems" scale, there was a significant difference between the CG and the IG ($p = 0.03$). Regarding the KHQ, both groups presented a general deterioration. Among the significant correlations, age showed a moderate correlation with the pad test ($p 0.03$) and there was a strong correlation between this test and urination urgency ($p 0.02$). Scores on the KHQ questionnaire showed strong correlations with the pad test.
Bernardes et al. 2022 ⁽¹⁴⁾	Study Type: Randomized Clinical Trial Patients: 68 men GI (35) and CG (33) Intervention: The two groups received face-to-face follow-up to carry out the PFMT and guidance to continue them at home. For orientation and follow-up of the patient, a booklet "Guidance manual on urinary incontinence post-radical prostatectomy" was used, which emphasizes the exercise that should be done that week, these had 6 steps with a description and illustration. The patient was evaluated weekly by the investigator and according to his progression he advanced to the next stage with more difficult exercises and if he did not continue in the same exercise one more week. In addition to PFMT, they received weekly acupuncture. Sessions: In both groups, 8 weekly sessions were held. Instruments: 3 evaluations before treatment (T0), after four weeks (T1) and 8 weeks of treatment (T2). In addition, the Pad test and Pad Daily Use were applied. Results: The IG showed less urinary loss compared to the CG. T1 ($P = 0.006$) and T2 ($p < 0.001$). Both groups experienced an improvement in UI over time, with this improvement being more noticeable in the intervention group ($p < 0.001$).
Szczygielska et al.	Study Type: Randomized Clinical Study

2022 ⁽¹⁵⁾	Patients: 60 men group A and B (40) Intervention: In all groups, the exercises consisted of 10 short contractions of 1s of the PFM and 10 long contractions of 10 s duration, in 3 positions: supine, sitting and standing. In addition, the flow of urine was interrupted once a day. In the GB, exercises with EMG biofeedback were carried out, in addition to the PFM re-education method, similar to the other groups. A NARAXON camera with superficial electrodes was used: 2 in the posterosuperior iliac spines and 2 at the level of the iliac plate. Exercises similar to the PFM were performed by activating the so-called stabilizers. Sessions: 10 weeks of training and at home 10 to 15 minutes of session 3 times a day. GA: 15 to 20 minutes of exercises in a physical therapist's office. GB: 20 to 30 minutes exercises in a physical therapist's office. GC: 15 to 20 minutes of exercises in a physical therapist's office. Instruments: AMTS, IADL, GDS, One Hour Pad Test. Results: PFMT was effective in all groups, with a more notable improvement in the GB group. Individual variability was observed among patients. Regarding the control of total urination in PAT 2, it was found that GA reduced 60%, GB reduced 85% and GC 45%. No significant correlations were found between the variables analyzed.
Heydenreich et al. 2020 ⁽¹⁶⁾	Study Type: Prospective randomized trial Patients: 184 men with GC (91) and GI (93) Intervention: GI: Supervised continence training and additional training for PFM with oscillating rods. The training device was a Bioswing Improvement 150. GC: Standard pelvic floor muscle exercises and relaxation therapy. Sessions: Daily 30 minutes for 3 weeks, in both groups. Instruments: 1 to 24 hour sanitary napkin test, HRQoL, FACT-P. Results: Treatment in the IG resulted in a significant reduction in UI (P = 0.0001) and an improvement in HRQoL compared to CG after 3 weeks of treatment (P = 0.017).
Anan et al. 2020 ⁽¹⁷⁾	Study Type: Randomized Controlled Study (Prospective) Patients: 70 GA (35) and GB (35) men Intervention: GA: Patients who started preoperative PFME 28 days prior to HoLPEL (anterograde separation method) and continued postoperatively. GB: Patients who started PFME only after the operation. Sessions: A series of 3 minutes, 3 times a day. Instruments: Sanitary Tolla, ICIQ-SF, IPSS, OABSS, Results: The UI rate was significantly lower at 3 months postoperatively in the GA (3%) than in the WBC (26%) (P = 0.01). There were no differences between groups 3 days, 1 month, 6 months postoperatively. The ICIQ-SF score does not differ between groups. Preoperative PFME was a predictor of UI 3 months after HoPEL (P = 0.01) and reduced the risk of UI 0.56 times lower at 1 month and 0.08 at 3 months. There were no significant differences in urodynamic outcomes between groups.
Atabey Gerlegiz et al. 2022 ⁽¹⁸⁾	Study Type: Randomized Controlled Trial Patients: 52 men Intervention: 40 contractions were performed, 10 rapid, 10 sustained and 20 submaximal. G1: PFMT with the Knack maneuver (performed during activities of daily living) and lifestyle recommendations. G2: PFMT with the Knack maneuver. G3: PFMT only. Sessions: 3 sessions per day for 8 weeks and a clinic visit every 2 weeks). Instruments: ICIQ-SF, 1-hour towel test, KHQ, PGI-S, PGI-I. Results: Significant improvements were obtained at week 8 compared to baseline. G1 showed superior improvements in the severity of urine leakage compared to the other groups, in aspects such as ICIQ-SF, limitations of the role of KHQ, physical limitations, emotional problems, and PGI-S scores (p< 0.05). No differences were found as in 1-hour Pad, KHQ scores and PGI-I scores (p> 0.05).
Mata et al. 2019 ⁽¹⁹⁾	Type of study: Randomized clinical trial. Patients: 68 men GI (34) and CG (34) Intervention: GI: Individualized support at 3 times after RP surgery: 2 days post-surgery (moment 0), a

brochure was given and information on UI care and devices was offered. Between the third and fifth day of hospital discharge (moment 1), a telephone contact was made to clarify doubts and reinforce guidelines of the leaflet (15 minutes). 30 days after discharge (moment 2), another telephone contact was made to review the care guidelines (12 minutes).

GC: They received the usual guidance on urinary device care and medical appointments, provided by health professions without phone follow-up or additional brochures.

Sessions: 30-day follow-up

Instruments: Sociodemographic and clinical questionnaire, general and perceived self-sufficiency scale, HADS, questionnaire to assess knowledge, item to assess satisfaction.

Results: Significant differences were found between the groups in satisfaction ($p < 0.001$) and knowledge ($p < 0.001$) at the end of the study. The IG showed significant improvements in satisfaction ($p < 0.001$) and knowledge ($p < 0.001$) from pretest to posttest, while the CG only improved in knowledge ($p = 0.005$). In addition, private care had higher pre-test satisfaction ($p = 0.018$) and those who were married or in a consensual union showed greater post-test satisfaction ($p = 0.023$). Regarding knowledge, the IG improved in 14 items ($p < 0.001$) post-test, with no pre-test differences between groups.

Type of study: Retrospective study

Patients: 31 men, 14 CG and 17 GI

Intervention:

Conventional treatment: (CG) Analytically improve the strength, endurance and coordination of PFMs, practiced individually and could be continued at home, they were carried out progressively first in supine position, followed by sitting and finally in standing. In addition, biofeedback and electrostimulation were applied using an anal sonsa.

Comprehensive treatment: (GI) Involves an individualized approach, addressing both the lumbopelvic region and the lower limbs. It includes flexibility, endurance and motor coordination exercises, focusing on the urethral sphincter.

Sessions: 45 to 60 minutes, 2 times a week, duration was less than 1 year.

Instruments: Questionnaire with the following data: age, profession, date of intervention, date of start of rehabilitation, level of compliance with medication prescription and level of physical activity. The EORTC-QLQ-C30 quality of life questionnaire was attached. Regarding physiotherapy, the level of performance of the self-performance exercises was evaluated. Data on continence were collected retrospectively

Results: No significant differences were found between the groups in treatment compliance (CG: 85%, GI: 70%, $p = 0.98$), therapeutic adherence (CG: 78%, GI: 94%, $p = 1.31$), and treatment acceptance (CG: 78%, GI: 76%, $p = 0.44$). In continence efficacy, there was a significant difference between the initial and 3-month pad-tests in both groups (CG: $\mu d = 183.4g$, GI: $\mu d = 102.2g$) with $p = 0.51$ in the Mann-Whitney test.

Type of study: Retrospective study

Patients: 112 men GA (58) and GB (54)

Intervention: Everyone is informed about the anatomy and function of PFM and how to contract them correctly.

WeChat has an instructional video that teaches how to properly perform PFME and sends out on a fixed schedule to remind them to take their training.

GA: Perform PFME with video at home.

GB: Perform PFME alone.

Sessions: 3 sets of 10 contractions a day for 6 to 8 seconds.

Instruments: WeChat

Results: The GA showed significant improvements in the 24-hour compress test, with 1-month cumulative improvements of 460 ± 119 g, compared to the 485 ± 125 g GB and the urinary continence recovery rate was higher in the GA compared to the WBC: 7% vs. 2% (1 month), 31% vs. 13% (3 months), 50% vs. 24% (6 months).

Steenstrup et al. 2021⁽²⁰⁾

Junwen et al. 2020⁽²¹⁾

GE: Experimental group. GC: Control group.

AMTS: Abbreviated mental test score.

HRQoL: Health-related quality of life.

EE: Electrical stimulation.

FACT-P: Functional Evaluation of Prostate Cancer Therapy.

HADS: Hospital Scale of Anxiety and Depression.

GDS: Geriatric Depression Scale.

IADL: Index of activities of daily living.

ICIQ-SF: Abbreviated questionnaire of the International Consultation on Incontinence.
IIEF-5: Erectile Function Index Questionnaire.
IPSS: International preoperative score for prostate symptoms.
KHQ: King Health Questionnaire.
OABSS: Overactive bladder symptom score.
PFM: Pelvic floor muscles.
PFMT: Preoperative pelvic floor muscle training physiotherapy.
PGI-S: Assessments of the global impression of severity.
PGI-I: Patient Improvement Impression Assessments.

Methodological quality

The quality of the information in the selected articles was evaluated with the PEDro scale⁽⁸⁾. Taking into account the established criteria, a study with a PEDro score of 6 or higher is considered as level of evidence 1 (6-8: good; 9-10: excellent), and a study with a score of 5 or lower is considered as level of evidence 2 (4-5: acceptable; < 4: poor)⁽⁸⁾. Of the 10 articles reviewed, the average score was 7 according to data provided by the Statistical Software for Social Sciences (SPSS). Of these, 1 article had a score of 10 points (rating: excellent)⁽¹⁰⁾, 1 article had a score of 8 points (rating: good)⁽¹⁹⁾, 2 articles had a score of 7 points (rating: good)^(16, 17), and 4 articles had a score of 6 points (rating: good)^(13,14,15,18). (Table 2).

Table 2. Analysis of methodological quality according to PEDro Scale												
Authors	Eleven items based on Table 1											Total /10
	1	2	3	4	5	6	7	8	9	10	11	
Milios et al. 2019 ⁽¹⁰⁾	-	+	+	+	+	+	+	+	+	+	+	10/10
Lira et al. 2019 ⁽¹¹⁾	+	+	-	+	-	-	+	+	+	+	+	7/10
Zachovajeviene et al. 2019 ⁽¹²⁾	+	+	+	+	-	-	-	+	+	+	+	7/10
García-Sánchez et al. 2022 ⁽¹³⁾	+	+	-	+	-	-	-	+	+	+	+	6/10
Bernardes et al. 2022 ⁽¹⁴⁾	+	+	+	+	-	-	-	+	-	+	+	6/10
Szczygielska et al. 2022 ⁽¹⁵⁾	+	+	-	+	-	-	-	+	+	+	+	6/10
Heydenreich et al. 2019 ⁽¹⁶⁾	+	+	+	+	-	-	-	+	+	+	+	7/10
Anan et al. 2020 ⁽¹⁷⁾	+	+	+	+	-	-	-	+	+	+	+	7/10
Atabey Gerlegiz et al. 2022 ⁽¹⁸⁾	-	+	-	+	-	-	-	+	+	+	+	6/10
Mata et al. 2019 ⁽¹⁹⁾	+	+	+	+	-	-	+	+	+	+	+	8/10

+ indicates that the item was clearly fulfilled, - indicates that the item was not fulfilled, ¿? indicates that it is not clear if the item was fulfilled or not, in any case it does not add up.

- The numbers in the columns correspond to the following items on the PEDro scale.
- Item 1: The selection criteria were specified.
 - Item 2: Subjects were randomly assigned to groups (in a crossover study, subjects were randomly assigned as they received treatments).
 - Item 3: The assignment was hidden.
 - Item 4: The groups were similar at baseline in relation to the most important prognostic indicators.
 - Item 5: All subjects were blinded.
 - Item 6: All therapists who administered the therapy were blinded.
 - Item 7: All assessors who measured at least one key outcome were blinded.
 - Item 8: Measures of at least one of the key outcomes were obtained from more than 85%

of the subjects initially assigned to the groups.
Item 9: Results were presented for all subjects who received treatment or were assigned to the control group, or when this could not be, data for at least one key outcome were analyzed by "intent to treat"
Item 10: Results of statistical comparisons between groups were reported for at least one key outcome.
Item 11: The study provides point and variability measures for at least one key outcome.

The final score was determined by the sum of the items that meet the established criteria, with the exception that item number 1 was not taken into consideration.

Retrospective studies were evaluated using the Newcastle-Ottawa Scale, and both articles were found to be of good quality^(20, 21) (Table 3).

Table 3. Newcastle-Ottawa Stopover										
Authors	Selection				Comparability		Results			Total 9/9
	Representativeness of the exposed cohort	Selection of the unexposed cohort	Determination of exposure	Outcome of interest not present at baseline	Cohort comparability		Evaluation of the result	Sufficient follow-up time	Adequacy of follow-up	
					Main factor	Additional factor				
Steenstrup et al. 2021 ⁽²⁰⁾	+	+	+	+	+	+	+	+	+	9/9
Junwen et al. 2020 ⁽²¹⁾	+	+	+	+	+	+	+	+	+	9/9
Yes: + (1 point) No: - (0 points)										

Characteristics of the bibliography

Of the 12 selected articles, 6 randomized clinical trials^(10, 11, 13, 14, 15, 19), 3 prospective randomized trials^(12, 16, 17), 1 randomized controlled trial⁽¹⁸⁾ and 2 retrospective studies^(20–21) were included.

These addressed various treatments at different stages such as: pelvic floor exercises before and after surgery^(10, 13, 17), pelvic floor exercises before and after surgery plus electromyographic biofeedback^(11, 15), pelvic floor exercises after surgery compared to diaphragm and abdominal exercises⁽¹²⁾, pelvic floor exercises before and after prostatectomy with a "Guidance Manual on Urinary Incontinence Post-Radical Prostatectomy" plus acupuncture⁽¹⁴⁾, pelvic floor exercises after surgery compared to Bioswing Improvement stimulation¹⁵⁰⁽¹⁶⁾, pelvic floor exercises after surgery compared with perineal pack⁽¹⁸⁾, training of the situation through a brochure and information was offered on care⁽¹⁹⁾, post-prostatectomy exercises with biofeedback with anal tube compared to a global approach addressing both the lumbopelvic region and the lower limbs with flexibility, resistance and motor coordination exercises, focusing on the urethral sphincter⁽²⁰⁾, pelvic floor training after surgery versus WeChat-accompanied training⁽²¹⁾.

Effects of the intervention

This article analyzes the effects of various interventions in patients undergoing surgery, evaluating the efficacy of treatments such as pelvic floor exercises (PFMT), acupuncture, and others in relation to urinary incontinence (UI) and quality of life, as

shown in Table 1, of which we can highlight:

Preoperative and postoperative training showed, according to the analysis of variance (ANOVA), statistically significant improvements in the intervention group, with respect to the weight of the 24-hour pads and urinary continence, with notable differences at 2, 6 and 12 weeks post-surgery. Post hoc t-tests revealed significant differences at all postoperative measurement points ($p < 0.05$) compared to the control group⁽¹⁰⁾.

Postoperative UI rate: Lower in the acupuncture group compared to the control group at 3 months, although without significant differences in the short term⁽¹⁷⁾.

On the other hand, in this study, treatment before and after surgery was effective in 51% of CG patients compared to 39% in the IG, a statistically non-significant difference. Both groups experienced a deterioration in UI-related quality of life, although with differences in certain emotional and physical aspects according to the SF-36 and KHQ scores⁽¹³⁾.

Acupuncture combined with PFMT was shown to be effective in reducing UTI levels in men after RP. Although PFMT alone is effective in addressing this problem, acupuncture enhances recovery more in reducing UI levels, showing significant improvements in tests such as the pad-test⁽¹⁴⁾.

The comparison of PAT 1 and PAT 2 showed a significant decrease in all groups GA ($p = 0.0000$), GB ($p = 0.0000$) and GC ($p = 0.0001$). Showing the efficacy of PFMT. According to the total urination control criterion in PAT 2, an average decrease of 2 ml was observed in the AG in 12 patients (60%), in the GB 17 patients (85%) with a decrease of 1.73 ml and in the CG 9 patients (45%) with an average decrease of 2.02 ml⁽¹⁵⁾.

Three months after RP, the UI rate was 72.7% CG and 70% GI ($P > 0.05$). There were no significant differences in ICIQ-SF in both groups. At baseline, patients had mild to moderate SD based on IIEF-5 scores, with no noticeable differences between groups. Three months after RP, the CG showed a trend towards slightly lower scores compared to the IG, but this difference was not statistically significant ($P = 0.745$). The levels of electromyographic activity in the pelvic floor and the external anal sphincter did not show significant differences between the groups either before or after RP⁽¹¹⁾.

During the study period, an increase in PFMS and PFME was observed in all training groups compared to baseline ($P > 0.001$). At the last measurement, PFMS was significantly higher in the PFMT group compared to the DMT group. PFME was higher in the DMT group (15.8s) vs. the PFMT group (13.5s) ($P < 0.001$), there was no significant difference with AMT (15.1s) ($P = 0.33$). UI decreased significantly in all groups compared to baseline ($P < 0.001$). At the end of the study, PFMT showed significantly higher PFMS peak strength compared to DMT (126.4 cmH₂O, $p = 0.03$). The ability to maintain PFME was higher in the DMT group (16.4s) compared to the PFMT group (13.6s) ($p < 0.0001$)⁽¹²⁾.

Comparing therapeutic exercise compliance, the CG showed 85% and the GI 70% ($p = 0.98$). In relation to therapeutic adherence to exercises, the CG showed 78% and

the IG 94% ($p = 1.31$). Regarding treatment acceptance, the CG showed 78% and the IG 76% ($p = 0.44$). As a result, no significant differences were found between the groups⁽²⁰⁾.

Regarding the efficacy of continence, a significant difference was observed between the initial pad-test and the 3-month pad-test, when comparing the two groups, it was obtained in the CG ($\mu\delta c=183.4g$) and in the IG ($\mu\delta e=102.2g$), using the Mann-Whitney test $p = 0.51$ ⁽²⁰⁾ was obtained.

Significant improvements were observed in UI measured by the 1-hour and 24-hour sanitary napkin test in the 2 study groups, but in GI it was significantly higher compared to CG ($P < 0.01$). Urine reduction with the 1-hour sanitary pad test was significantly greater in GI after 3 weeks of treatment (mild, $P = 0.05$; moderate, $P = 0.094$; large, $P = 0.003$) and an improvement in HRQoL ($P < 0.001$) compared to CG ($P = 0.001$), as measured in the FACT-P questionnaire after three weeks of treatment was significantly greater in GI compared to CG ($P = 0.017$)⁽¹⁶⁾.

At week 8 there were significant differences in all outcome measures compared to baseline. Significant differences were found between the groups in improvements related to ICIQ-SF, limitations of the role of KHQ, physical limitations, subdomains of emotional problems and PGI-S scores ($p < 0.05$), G1 showed a superior improvement in these aspects compared to the other groups. No differences were observed between groups in 1-hour pad, KHQ and PGI-I scores ($p > 0.05$). Therefore, the combination of PFMT with the Knack maneuver and comprehensive lifestyle recommendations appears to be more effective than PFMT alone in reducing the severity of urine leakage⁽⁹⁾.

The GA showed improvements in the 24-hour compress test with results of 476 ± 132 g (3 days), 254 ± 76 g (1 month), 76 ± 47 g (3 months), 23 ± 31 g (6 months), and 5 ± 3 g (12 months). The WBC had comparatively lower results: 513 ± 148 g (3 days), 293 ± 86 g (1 month), 98 ± 58 g (3 months), 48 ± 41 g (6 months), and 11 ± 5 g (12 months). Improvement (12-month consequence - 3-day consequence) was significantly greater in GA (460 ± 119 g vs. 485 ± 125 g). The rate of recovery from urinary continence was also higher in the GA at the different time intervals: 7% vs. 2% (1 month), 31% vs. 13% (3 months), 50% vs. 24% (6 months)⁽²¹⁾.

The initial similarity between groups in self-sufficiency, anxiety, psychological morbidity, satisfaction and knowledge was verified. Significant differences were found between the IG and CG in satisfaction ($p < 0.001$) and knowledge ($p < 0.001$) after the study. The IG showed significant changes in satisfaction ($p < 0.001$) and knowledge ($p < 0.001$) from pretest to posttest, while the CG only showed significant changes in knowledge ($p = 0.005$). There were no significant changes in self-sufficiency or psychological morbidity in either group. However, a significant change in anxiety was identified from pretest to post-test in the IG ($p = 0.011$), when considering the analysis of anxiety from a cut-off point. It was found that the type of care and marital situation influenced satisfaction and knowledge after the intervention. Private care showed greater satisfaction in the pre-test ($p = 0.018$), married or in a consensual union showed greater satisfaction in the post-test ($p = 0.023$) than singles in the IG. In terms of knowledge, in the post-test, the IG showed a significant improvement in 14 items ($p < 0.001$) related to postoperative care, UI,

pelvic exercises, among others, after the intervention, with no differences between groups before the test⁽¹⁹⁾.

4. Discussion

The study evaluates multiple physiotherapeutic treatments for post-prostatectomy urinary incontinence, highlighting the importance of pelvic floor training and the integration of other physiotherapeutic methods to improve outcomes.

- Effectiveness of Pre and Post-Surgical Training:

Our analysis highlights the importance of pelvic floor training, both before and after surgery. Studies such as that of Milios et al. They have shown that the combined activation of fast and slow fibers in the pelvic floor leads to optimal results. Anan et al. support this claim, observing significant improvements in continence at three months post-surgery. However, García-Sánchez et al. They noted that the results were not significant in the first month, suggesting the importance of time in training for effective recovery.

- Training Combined with Other Techniques:

Studies such as those by Bernardes et al. and Szczygielska et al. They show that combining pelvic floor training with acupuncture or biofeedback improves continence and speeds recovery. The presence of physiotherapists during training seems to be a key factor in the effectiveness of the treatment.

- Core Training Integration:

Zachovajeviene et al. and Steenstrup et al. They highlight the effectiveness of integrating training of the diaphragm and abdominal muscles, as well as flexibility and resistance exercises of the lumbopelvic region. This suggests that a holistic approach involving the entire core is essential to achieving continence.

- Use of Additional Devices and Techniques:

Heydenreich et al. and Atabey Gerlegiz et al. show that adding oscillating devices or the perineal knack maneuver, together with modifications in lifestyle habits, significantly improves results. Junwen et al. show that using devices like WeChat to guide pelvic floor training is more effective than exercises alone.

- Impact on Quality of Life:

The study by Mata et al. It underlines that patient education about incontinence, post-operative care and pelvic exercises is critical to successful recovery, providing detailed information and support improves patient satisfaction, knowledge and adherence to treatment.

- Implications for Clinical Practice:

This review highlights the importance of a multifaceted approach in the treatment of post-prostatectomy urinary incontinence. The combination of pelvic floor training with other physiotherapeutic techniques, the incorporation of a holistic approach

involving the core and patient education emerge as key elements to improve continence and quality of life. The duration and intensity of the training, along with the supervision of a physiotherapist, are critical factors for the success of the treatment.

5. Conclusions

- After the systematic review of studies that address physiotherapy as a treatment for post-prostatectomy urinary incontinence, it is established that this therapeutic approach is effective for the management of this condition, achieving continence and improving the quality of life of patients who suffer from it.
- When comparing the efficacy of pelvic floor exercises with other types of intervention, we found that pelvic floor exercises proved to be a very promising treatment option for treating post-prostatectomy urinary incontinence, but their effect can be enhanced and reduce treatment time by adding patient education before and after surgery to the exercise. the accompaniment of the physiotherapist in the office, using physiotherapy techniques such as: acupuncture, biofeedback, full-body exercise focusing on the diaphragm, abdominals and lower limbs, the use of the perineal knack maneuver and modifications of daily life habits and undoubtedly working at home is very important for this follow-up devices such as Wechat can be used.
- Regarding the timing of physiotherapy initiation, studies suggest that both preoperative and postoperative physiotherapy programmes can be beneficial. However, programs that begin before surgery and are maintained immediately after catheter removal appear to provide the best results in terms of reducing the number of diapers in shorter treatment time.

ETHICAL RESPONSIBILITIES

Protection of people and animals

No experiments have been carried out on humans or animals for this research

Confidentiality and Informed Consent

No interventions have been carried out in humans for this research

Privacy

This article does not include patient data

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Conflict of interest statement

The authors declare that they have no conflict of interest.

Redundant Publishing

The authors declare that the content of the article is original and that it has not been previously published

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