CRITICALLY APPRAISED TOPIC

FOCUSED CLINICAL QUESTION

For adults with neurogenic bladder as a result of a spinal cord injury or Multiple Sclerosis (P), how does the use of electrical stimulation (I) influence episodes of urinary incontinence (O) compared to pelvic floor muscle training alone (C)?

AUTHOR

Prepared by	Sarah Richardson	**Date**	11/28/20
Email address	Sarah_e_richardson@med.unc.edu		

CLINICAL SCENARIO

A 30-year-old female is ten years out from a traumatic motor vehicle accident that resulted in an incomplete T-10 spinal cord injury (ASIA D). The patient was referred for pelvic floor physical therapy after sharing with the primary care provider that she was experiencing frequent episodes of urinary incontinence. The patient would like to reduce the number of urinary leakage episodes and volume lost during each episode. She also worries that her only course of treatment is self-catheterization and medical intervention, so she is seeking to explore non-surgical and non-pharmacologic treatment options first. Since pelvic floor muscle training is often utilized in other female patient populations for urinary incontinence[1], I am curious as to if pelvic floor physical therapy and pelvic floor muscle training may assist a patient with a neurologic condition with impacted pelvic floor innervation and subsequent urinary symptoms. Additionally, electrical stimulation has been speculated by current evidence to be more effective than no treatment or sham treatment for stress urinary incontinence in women[2]. So, I hope to determine if pelvic floor muscle training, electrical stimulation, or a combination of the two is appropriate and effective in reducing urinary incontinence in a female with a spinal cord injury or other neurologic conditions affecting the spinal cord.

SUMMARY OF SEARCH

[Best evidence appraised and key findings]

Eight studies met the inclusion and exclusion criteria including two systematic reviews, three randomized controlled trials, a retrospective study, a case series, and a case report.

- Pelvic floor muscle training may improve symptoms associated with urinary incontinence in females with an incomplete spinal cord injury and multiple sclerosis.[3,4]
- Pelvic floor muscle training is a safe and feasible intervention for urinary incontinence in females with an incomplete spinal cord injury and multiple sclerosis.[3,4]
- Intravaginal electrical stimulation when combined with pelvic floor muscle training does not enhance improvements in urinary incontinent episodes in females with incomplete spinal cord injuries.[3]
- Intravaginal electrical stimulation when combined with pelvic floor muscle training may enhance short-term improvements in urinary incontinent episodes in females with multiple sclerosis.[4]

CLINICAL BOTTOM LINE

Females with incomplete spinal cord injuries or multiple sclerosis experiencing urinary incontinence may benefit from the use of pelvic floor muscle training implemented by a licensed pelvic floor physical therapist. Therapists hoping to utilize this intervention should understand that the degree of improvement may be minimal given the limitations in current research efforts, however it is a safe and feasible treatment approach for these patient population. There is not convincing enough evidence to implement a pelvic floor muscle training program combined with intravaginal electrical stimulation. If intravaginal electrical stimulation is implemented, potential benefits will more likely be seen in patients with multiple sclerosis as opposed to patients with incomplete spinal cord injuries. Therapists, however, should use caution when considering the use of this modality in their plan of care given the limitations within current research.

This critically appraised topic has been individually prepared as part of a course requirement and has been peer-reviewed by one other independent course instructor

The above information should fit onto the first page of your CAT

SEARCH STRATEGY

Terms used to guide the search strategy			
Patient/Client Group	**I**ntervention (or Assessment)	**C**omparison	**O**utcome(s)
"incomplete spinal cord injury" "spinal cord injury" "SCI" "Multiple sclerosis" "MS" "adult"	"electrical stimulation" "intravaginal electrical stimulation" "e-stim"	"pelvic floor muscle training" "PFMT" "pelvic floor muscle training exercises" "pelvic floor physical therapy" "pelvic floor"	"urinary incontinence" "urinary leakage" "urinary leakage episode" "urinary leakage frequency"

Final search strategy (history):

Show your final search strategy (full history) from PubMed. Indicate which "line" you chose as the final search strategy.

((((incomplete spinal cord injury) OR (spinal cord injury)) OR (SCI)) OR (Multiple Sclerosis)) OR (MS)

((electrical stimulation) OR (intravaginal electrical stimulation)) OR (e-stim)

((((pelvic floor physical therapy) OR (pelvic floor physiotherapy)) OR (pelvic floor muscle training)) OR (PFMT)) OR (pelvic floor)

((((neurogenic bladder) OR (urinary leakage)) OR (urinary incontinence)) OR (urinary dysfunction)) OR (bladder dysfunction)

(((((((incomplete spinal cord injury) OR (spinal cord injury)) OR (SCI)) OR (Multiple Sclerosis)) OR (MS)) AND (((electrical stimulation) OR (intravaginal electrical stimulation)) OR (e-stim))) AND (((((pelvic floor physical therapy) OR (pelvic floor physiotherapy)) OR (pelvic floor muscle training)) OR (PFMT)) OR (pelvic floor))) AND (((((neurogenic bladder) OR (urinary leakage)) OR (urinary incontinence)) OR (urinary dysfunction)) OR (bladder dysfunction))

(((((((incomplete spinal cord injury) OR (spinal cord injury)) OR (SCI)) OR (Multiple Sclerosis)) OR (MS)) AND (((electrical stimulation) OR (intravaginal electrical stimulation)) OR (e-stim))) AND (((((pelvic floor physical therapy) OR (pelvic floor physiotherapy)) OR (pelvic floor muscle training)) OR (PFMT)) OR (pelvic floor))) AND (((((neurogenic bladder) OR (urinary leakage)) OR (urinary incontinence)) OR (urinary dysfunction)) OR (bladder dysfunction)) Filters: in the last 10 years, Adult: 19+ years, Young Adult: 19-24 years, Adult: 19-44 years, Middle Aged + Aged: 45+ years, Middle Aged: 45-64 years, Aged: 65+ years, 80 and over: 80+ years

(((((((incomplete spinal cord injury) OR (spinal cord injury)) OR (SCI)) OR (Multiple Sclerosis)) OR (MS)) AND (((electrical stimulation) OR (intravaginal electrical stimulation)) OR (e-stim))) AND (((((pelvic floor physical therapy) OR (pelvic floor physiotherapy)) OR (pelvic floor muscle training)) OR (PFMT)) OR (pelvic floor))) AND (((((neurogenic bladder) OR (urinary leakage)) OR (urinary incontinence)) OR (urinary dysfunction)) OR (bladder dysfunction)) Filters: in the last 10 years, Adult: 19+ years, Young Adult: 19-24 years, Adult: 19-44 years, Middle Aged + Aged: 45+ years, Middle Aged: 45-64 years, Aged: 65+ years, 80 and over: 80+ years, English

In the table below, show how many results you got from your search from each database you searched.

Databases and Sites Searched	**Number of results**	**Limits applied, revised number of results (if applicable)**
Pubmed	**11**	**Filters: Age 19 – 80+ years, within last 10 years, English**
Cochrane	**6**	

PEDro	**1**	**"spinal cord injury" "pelvic floor" "stimulation"**
Clinicaltrials.gov	**9**	**"urinary incontinence", "electrical stimulation", "pelvic floor muscle training"**
Web of Science	**11**	**TOPIC: "pelvic floor" AND TOPIC: "spinal cord injury" AND TOPIC: urinary incontinence**

INCLUSION and EXCLUSION CRITERIA

Inclusion Criteria
• Adults with incomplete spinal cord injuries or multiple sclerosis • Intervention compared with some kind of pelvic floor muscle training program (ideally administered by a physical therapist) • Human Species • Randomized Controlled trials • Case Reports • Systematic Reviews
Exclusion Criteria
• Not published in English • Publication Date before 2000 • Age below 18 • Observational Studies • Narrative Review Articles

RESULTS OF SEARCH

Summary of articles retrieved that met inclusion and exclusion criteria

For each article being considered for inclusion in the CAT, score for methodological quality on an appropriate scale, categorize the level of evidence, indicate whether the relevance of the study PICO to your PICO is high/mod/low, and note the study design (e.g., RCT, systematic review, case study).

Author (Year)	Risk of bias (quality score)*	Level of Evidence**	Relevance	Study design
Elmelund (2018)[3]	**Pedro - 5/10**	**Level 1b**	**High**	**Single- Blind RCT (assessor)**
Gross (2016)[5]	**AMSTAR 2 - Moderate confidence**	**Level 2a: systematic review of level 2 diagnostic studies**	**Moderate**	**Systematic Review**
Moore (2006)[6]	**JBI Critical Appraisal Checklist – 3/8**	**Level 5**	**High**	**Case Report**
Bragge (2019)[7]	**AMSTAR 2 – Low confidence**	**Level 1**	**Low**	**Systematic Review of Clinical Practice Guidelines**
Lúcio (2016)[4]	**Pedro – 5/10**	**Level 1b**	**High**	**RCT**
Tudor (2020)[8]	**Downs and Black Checklist – 17/31**	**Level 3b**	**Moderate**	**Retrospective Study**
Xia (2014)[9]	**Pedro – 5/10**	**Level 1b**	**Moderate**	**RCT**
Vásquez (2015)[10]	**JBI Critical Appraisal Checklist - 7/8**	**Level 4**	**High**	**Case Series**

*Indicate tool name and score

**Use Portney & Watkins Table 16.1 (2009); if downgraded, indicate reason why

BEST EVIDENCE

The following 2 studies were identified as the 'best' evidence and selected for critical appraisal. Rationale for selecting these studies were:

- Elmelund M, Biering-Sørensen F, Due U, Klarskov N. The effect of pelvic floor muscle training and intravaginal electrical stimulation on urinary incontinence in women with incomplete spinal cord injury: an investigator-blinded parallel randomized clinical trial. *Int Urogynecol J*. 2018;29(11):1597-1606. doi:10.1007/s00192-018-3630-6
  - Level 1b evidence; directly compares PFMT and electrical stimulation in patients with neurogenic bladder as a result of an SCI; fair quality study (5/10 Pedro Scale)
- Lúcio A, D'ancona CAL, Perissinotto MC, McLean L, Damasceno BP, de Moraes Lopes MHB. Pelvic floor muscle training with and without electrical stimulation in the treatment of lower urinary tract symptoms in women with multiple sclerosis. *J Wound Ostomy Continence Nurs*. 2016;43(4):414-419. doi:10.1097/WON.0000000000000223
  - Level 1b evidence; directly compares PFMT and two different kinds of electrical stimulation in patients with neurogenic bladder as a result of MS; fair quality study (5/10 Pedro Scale)

SUMMARY OF BEST EVIDENCE

(1) Description and appraisal of (The effect of pelvic floor muscle training and intravaginal electrical stimulation on urinary incontinence in women with incomplete spinal cord injury: an investigator-blinded parallel randomized clinical trial) by (Elmelund et al., 2018)

Aim/Objective of the Study/Systematic Review:

This study aimed to determine the effect of pelvic floor muscle training compared to pelvic floor muscle training combined with intravaginal electrical stimulation for urinary incontinence in women with incomplete spinal cord injury.

Study Design

[e.g., systematic review, cohort, randomized controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]

Note: For systematic review, use headings 'search strategy', 'selection criteria', 'methods' etc. For qualitative studies, identify data collection/analyses methods.

This study by Elmelund et al. is an investigator-blinded parallel-group randomized clinical trial that consisted of 27 women with incomplete spinal cord injury (SCI). The research assistants, treating physiotherapists, and study participants were aware of their randomization, however, the primary investigator who assessed the outcomes and analyzed the data was blinded. After enrolment and randomization, all participants attended a second visit where they received an individualized consultation with a therapist. The treatment group involved pelvic floor muscle training (PFMT) and intra-vaginal electrical stimulation (IVES). The control group only received pelvic floor muscle training. Outcomes were measured right after enrolment (week 0), after the 12-week intervention (week 12), and 12 weeks following the study (week 24). To see a significant change in the total score of ICIQ – UI – SF (the primary outcome measure) of 5 (SD 4) with a two-sided 5% significance level and power of 80%, researchers needed a sample size of 10 per group. Researchers only analyzed data for the women who completed the study, rather than as an intention-to-treat analysis. Statistical analyses were repeated in two subgroups as post-hoc analysis after excluding participants who trained <50% of the days in the intervention period and participants with stress or undefined UI. For all statistical analyses, $p < 0.05$ was considered statistically significant.

Setting

[e.g., locations such as hospital, community; rural; metropolitan; country]

All participants were recruited from a spinal cord injury clinic in Denmark associated with the University of Copenhagen. The screening visit was conducted at the Herlev and Gentofte Hospital in the Department of Obstetrics and Gynecology. The second visit with the physical therapist was performed at the Herlev and Gentofte Hospital in the Department of Occupational and Physical Therapy.

Participants

[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]

Note: This is not a list of the inclusion and exclusion criteria. This is a description of the actual sample that participated in the study. You can find this descriptive information in the text and tables in the article.

A total of 37 women were recruited and eligible for this study, however only 27 completed the study. They were all recruited from a spinal cord injury clinic in Denmark. Women were included if they were between the ages of 18 and 75 years old, had incomplete SCI, and urinary incontinence evidenced by a score of >8 on the International Consultation on Incontinence Questionnaire UI short form. Participants were excluded if they had complete motor spinal cord injuries (ASIA A or B), were unable to contract the pelvic floor muscles (PFMs), had received a botulinum toxin injection within the last year, were pregnant, or used a pacemaker. To determine eligibility, all potential participants were screened by the primary investigator for voluntary PFM contraction through a digital vaginal and rectal examination. Eligible participants were then randomized to either the PFMT group or PFMT combined with IVES group via computer-generated randomization. The average age of participants was 55 years old, with a variety of injury levels (cervical (23%), thoracic (31%), lumbar (46%) and completeness (ASIA C (22%), ASIA D (74%), ASIA E (4%)), that were on average, 11 years after injury. Participants had a mixture of urinary incontinence (stress (15%), urgency (30%), mixed (48%), and undefined (7%)). The women in the PFMT + IVES group were significantly older, had a lower mean and maximum functional bladder capacity, used more pads, had a lower daily fluid intake and daily diuresis, and had a higher score on the ICIQ – OAB compared to women in the PFMT group. Four women in each group discontinued the study. The timing of dropouts occurred at the same time in both groups: one before the active intervention, two after 0 – 4 weeks of active intervention, and one after 4 – 8 weeks of active intervention. Researchers did not comment on the reasons behind the participant's decision to drop out of the study.

Intervention Investigated

[Provide details of methods, who provided treatment, when and where, how many hours of treatment provided]

Control

Each participant attended a screening visit with the primary investigator where they were examined using a digital vaginal and rectal examination to determine if they were able to perform a voluntary PFM contraction (an inclusion criterion for this study). If participants were eligible to continue in the study, they were randomized to either the control group (PFMT only) or the treatment group (PFMT + IVES). After enrolment, all participants attended a second visit. This visit was conducted by a licensed pelvic floor physical therapist. The PFMT protocol involved instructing participants to perform 30 near-maximal contractions of 5 – 10 second duration followed by 10 seconds of rest (adjusted to the woman's PFM function). After this second visit, participants were asked to continue training daily for 12 weeks and to complete a daily training diary. During this training period, all participants had two consultations with a physical therapist during week 4 and week 8 to assess compliance and accuracy of the training parameters. To ensure motivation, participants were also offered a phone consultation during weeks 2, 6, and 10.

Experimental

The second visit was conducted by a licensed pelvic floor physical therapist. In the second visit, women in the PFMT combined with IVES group were instructed to perform the PFMT discussed previously while simultaneously using the IVES devise. Participants were taught two programs using the IVES device. These programs had two intentions. The first was to help promote endurance and enhanced PFM strength and the second was to promote PFM relaxation. To enhance endurance and strength, intermittent stimulation parameters were set to a frequency of 40 Hz, a pulse width of 250 μs for 30 cycles within 7.5 to 10 minutes (5 – 10 sec of stimulation, 10 sec of rest). During electrical stimulation, participants were instructed to perform simultaneous PFM contractions. The relaxation continuous stimulation parameters were set to a frequency of 10 Hz, pulse width of 250 μs, for 10 to 20 minutes. During the stimulation, participants were instructed to relax their PFMs. After this second visit, participants were asked to continue training daily for 12 weeks and to complete a daily training diary. During this training period, all participants had two consultations with a physical therapist during week 4 and week 8. To ensure motivation, participants were also offered a phone consultation during weeks 2, 6, and 10. At week 12, the participants returned the IVES device and were encouraged to continue with PFMT.

Outcome Measures

[Give details of each measure, maximum possible score and range for each measure, administered by whom, where]

The primary outcome measured was the change in total score on International Consultation on Incontinence Questionnaire UI short form (ICIQ – UI- SF). This questionnaire contains questions regarding frequency, severity, and impact of UI on QoL. Scores range from 0 – 21 with a higher score indicating worse symptoms.

Secondary outcomes included a change in opening urethral pressures during PFM contraction and at rest with urethral pressure reflectometry, change in 3- day bladder diary parameters (daily episodes of UI, mean bladder capacity, max functional capacity, and the number of daily voiding episodes), 24-hour pad test, the total score on International Consultation on Incontinence Questionnaire overactive bladder (ICIQ-OAB), the total score on International SCI QoL Basic Data Set (SCI- QoL). The ICIQ-OAB ranges from 0 – 56, with a higher score indicating worse symptoms. The SCI-QoL ranges from 0 – 30 with a higher number indicating greater satisfaction or quality of life. At week 12, or directly following the intervention, the Patient Global Impression of Improvement Scale (PGI-I) was used as well.

Main Findings

[Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. You may summarize results in a table but you must explain the results with some narrative.]

Table 1. Change in outcome measures after 12 weeks

Outcome Measures	*n*	PFMT (control)	*n*	PFMT + IVES (treatment)	IVES + PFMT – PFMT (adjusted for baseline value)	*P*
ICIQ-UI-SF	13	-2.4 (-4.3 – -0.5)* ***p=0.018***	14	-2.2 (-4.8 - 0.4)	0.4 (-2.8 – 3.6)	0.8

ICIQ - OAB	13	1.6 (-6.9 – 10.1)	14	-3 (-10.3 – 4.3)	2.4 (-8.6 – 13.3)	0.7
Reflectometry - Opening urethral pressure-squeezing - Opening urethral pressure – resting	13 13	7.7 (1.7 – 13.8)* ***p =0.017*** 3.9 (0.5 – 7.3)* ***p=0.03***	14 14	1.4 (-2.4 – 5.2) -1.3 (-4.6 – 1.9)	-5.2 (-12.3 – 1.8) -5.7 (-10.4 – 1.1)	0.14 **.018**
3 Day Bladder Diary - Daily Incontinence - Mean bladder capacity - Max bladder capacity - Daily voiding	11 12 12 12	-0.4 (-0.8- -0.1)* ***p=0.03*** 22 (-43-87) -67(-175-41) -0.6(-1.9-0.7)	12 13 13 13	0.1 (-0.6-0.8) -3 (-20-15) -9 (-56-38) -0.5(-1.6-0.7)	0.6(-0.2-1.4) -23(-117-70) -46(-172-80) 0.9(-0.5-2.2)	0.14 0.6 0.5 0.18
24 – hour pad test	12	-6 (IQR -54 – 5)	12	-32.5 (IQR -112-3)		0.6
SCI- QoL	12	2 (IQR 0 – 6)	14	1 (IQR -3 – 6)		0.7
PGI-I	13	3 (IQE 2 – 4)	14	3 (IQR 3-4)		0.7

No significant between-group differences were found at week 12, except for opening urethral pressure at rest. Within-group analyses found significant changes (*) in the PFMT for the total score on ICIQ-UI-SF, opening urethral pressure squeezing, opening urethral pressure at rest, and daily incontinence episodes.

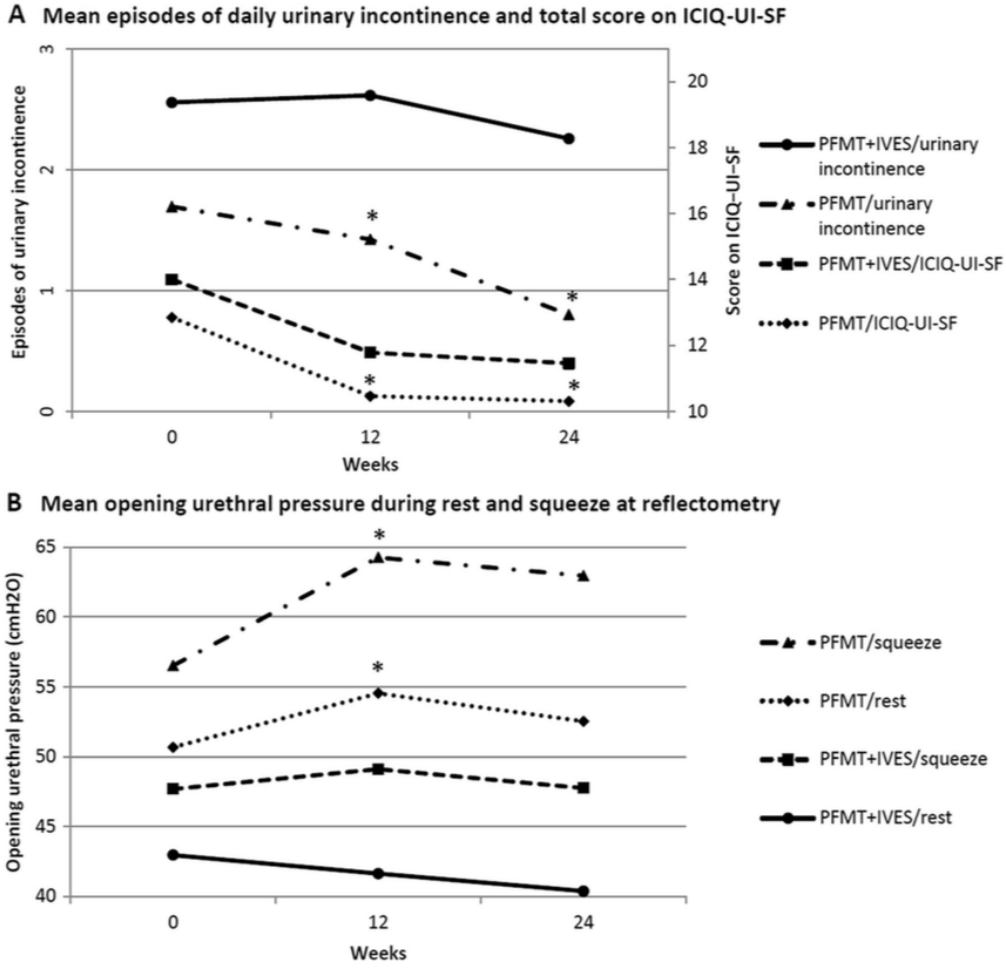
Table 2. Change in outcome measures at 24 weeks

Outcome Measures	*n*	PFMT (control)	*n*	PFMT + IVES (treatment)	IVES + PFMT – PFMT (adjusted for baseline value)	*P*
ICIQ-UI-SF	13	-2.5 (-4.5 – -0.6)* ***p=.016***	13	-2.2 (-5.5 - 0.4)	0.3 (-3.1 – 3.7)	0.8
ICIQ - OAB	13	1.2 (-5.8 – 8.1)	13	-5.8 (-9 – -2.7)* ***p=.002***	-4.2 (-12.4 – 4.1)	0.3
Reflectometry - Opening urethral pressure-squeezing - Opening urethral pressure – resting	13 13	6.4 (-0.2– 13) 1.9 (-2.7 – 6.4)	13 13	1.5 (-2.5 – 5.4) 0.1 (-3.3 – 3.4)	-3.9 (-11.8 – 3.9) -1.0 (-6.9 -4.9)	0.3 0.7
3 Day Bladder Diary - Daily Incontinence - Mean bladder capacity - Max bladder capacity	10 12 12 12	-0.6 (-1.0- -0.2)* ***p=.01*** -25 (-71-21) -120(-227- -13)* ***p=.031***	11 13 13 13	-0.1 (-1.1-0.9) 12 (-17-42) -3 (-50-44) -0.4(-1.3-0.5)	-0.6(-0.6-1.7) 12(-55-79) 17(-101-135) 0.2(-1.0-1.4)	0.3 0.7 0.8 0.7

- Daily voiding		0 (-1.4-1.4)				
24 – hour pad test	11	-11 (IQR -84 – -2)* ***p=.02***	12	-13.5 (IQR -101-17)		0.7
SCI- QoL	13	3 (IQR 0 – 6)	13	1 (IQR -2 – 3)		0.3
PGI-I	13	3 (IQE 3 – 4)	13	3 (IQR 3-4)		0.9

No significant changes were found between-group differences in outcome measures at 24 weeks from baseline. The within-group analysis showed significant change from baseline (*) in the PFMT group on the ICIQ-UI-SF, number of daily incontinence episodes, maximal functional bladder capacity, and 24-hour pad test. The PFMT + IVES group improved on ICIQ-OAB.

Fig. 1. Mean episodes of change for secondary outcome measured across 24 weeks



*p<.05

Chart obtained from the study on page 8. The PFMT group showed a significant reduction in average episodes of daily urinary incontinence and total score on ICIQ-UI-SF which was maintained at follow-up. The urinary incontinence episodes were reduced by 25% in the PFMT group and only 3% in the PFMT+IVES group. The PFMT group showed significant improvements in the opening urethral pressure during rest and contraction, but these changes were not maintained at follow-up.

Original Authors' Conclusions

[Paraphrase as required. If providing a direct quote, add page number]

IVES combined with PFMT is not a superior treatment approach to neurogenic UI following an SCI compared to PFMT alone. On page 9 the authors state "IVES with PFMT is not superior to PFMT alone in reducing UI, and PFMT should be recommended as the first-line conservative treatment of UI in women with incomplete SCI".

Critical Appraisal

Validity

[Summarize the internal and external validity of the study. Highlight key strengths and weaknesses. Comment on the overall evidence quality provided by this study.]

This level 1b, investigator-blinded parallel-group randomized clinical trial by Elmelund et al. has fair quality based on the PEDro scale for risk of bias tool. Given the heterogeneity of this patient population and the inherent difficulties in consistent blinding within therapeutic studies with hands-on interventions, I think a fair score on the PEDro indicates a relatively strong study. To enhance bias, the primary investigator was blinded when performing data analysis and the participants were randomly allocated to either the treatment or control group. Additionally, despite a smaller sample size, the researchers met the minimum sample size to achieve at least 80% testing power. A considerable strength of this study is the fact that they recorded all results, including the nonconfirmatory results. Another strength was the use of a variety of outcome measures that involved both subjective and objective information. I felt the use of a variety of outcome measures (both primary and secondary) created a clearer picture of the overall effect of the treatment. A weakness of the study is there was no placebo group to compare to. Although the study outlined the differences between PFMT and PFMT + IVES, it is unclear if participants would be better off with no treatment

or how impactful treatments are in general. Another weakness of the study is despite random allocation, the two groups differed at baseline which leads one to question the comparisons made at 12 and 24 weeks. A final noted weakness to this study was the participants primarily performed the intervention at home without supervision. Although they filled out exercise logs, there is no way to confirm that participants performed the intervention consistently and therefore there is a possibility that results could have lesser or greater significance.

Interpretation of Results

[This is YOUR interpretation of the results taking into consideration the strengths and limitations as you discussed above. Please comment on clinical significance of effect size / study findings. Describe in your own words what the results mean.]

The most promising evidence from the Elmelund et al. study is related to the frequency of daily urinary incontinence and scores on the ICIQ-UI-SF for the PFMT only group. Women who received PFMT alone showed significant improvements in the number of daily urinary incontinence episodes as well as the perceived impact of urinary incontinence on quality of life, as evidenced by scores on the ICIQ – UI – SF. The confidence intervals at follow-up appear to be relatively narrow for the frequency of incontinent episodes and ICIQ-UI- SF respectively, (-1 - -.2) and (-4.5 - -0.6). Additionally, these measures achieved high significance at p= .016 and p=.01, for ICIQ-UI-SF and daily urinary incontinence episodes, respectively. Typically, a smaller sample size will result in a wider confidence interval with a larger margin of error, yet researchers maintained smaller confidence intervals. Despite this, the use of smaller sample sizes requires some caution when interpreting the clinical significance of these results. It should be noted that the groups differed at baseline with the PFMT + IVES group being significantly older and beginning the study with arguably more significant urinary symptoms. These differences could skew the treatment effects and ability to compare results at follow-up. For example, this study found that PFMT +IVES was not superior to PFMT only, however, if both groups were homogenous at baseline then there is a possibility that the PFMT + IVES group would have shown greater improvements. Additionally, outcomes immediately following treatment and at follow-up showed no significant differences between the groups. Although the PFMT showed within-group significant changes, the lack of significant between-group differences leads me to question how effective PFMT is as a stand-alone treatment for this patient population.

Applicability of Study Results

[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.]

This study is highly applicable to this clinical scenario as this participant population consists of women with spinal cord injuries and urinary incontinence. Additionally, 31% of this population had a thoracic level injury, 74% had ASIA-D level impairment, and on average they were 11 years post-injury. These demographic statistics align with the patient that inspired this clinical inquiry. The aims of this study also align with my clinical question since they investigated the effect of PFMT only versus PFMT and IVES for urinary incontinence in women with spinal cord injuries. Although PFMT and PFMT + IVES did not cause harm, the evidence from this study is not convincing enough to encourage the use of PFMT only or PFMT + IVES as an effective treatment for patients with SCI and urinary incontinence. Based on the results of this study, PFMT alone should be the preferred treatment choice for an individual with an SCI experiencing urinary incontinence over PFMT with IVES. However, the significance of clinical improvement may be minimal following PFMT in this patient population. Lastly, personalized equipment (probe) is required to utilize intravaginal electrical stimulation which may be a barrier for many individuals depending on their financial status and insurance provider. Although the feasibility of implementing a program with IVES for patients with SCI is simple and is easily combined with a PFMT program, considerations should be made to the financial investment and accessibility of this treatment option for patients with SCI experiencing urinary incontinence. Lastly, depending on the level and severity of the SCI, the placement of the probe may be difficult for certain patients with SCI.

(2) Description and appraisal of (Pelvic Floor Muscle Training With and Without Electrical Stimulation in the Treatment of Lower Urinary Tract Symptoms in Women with Multiple Sclerosis) by (Lúcio et al./2016)

Aim/Objective of the Study/Systematic Review:

The study aimed to evaluate and compare the impact of pelvic floor muscle training (PFMT) alone and in combination with intravaginal neuromuscular stimulation (NMES) or transcutaneous tibial nerve stimulation (TTNS) for women with multiple sclerosis (MS) and lower urinary tract symptoms (LUTS).

Study Design

[e.g., systematic review, cohort, randomized controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]

Note: For systematic review, use headings 'search strategy', 'selection criteria', 'methods' etc. For qualitative studies, identify data collection/analyses methods.

This study by Lúcio et al. is a prospective randomized controlled trial that consisted of 30 women diagnosed with MS that were experiencing lower urinary tract symptoms. All participant assessments were performed before and after the treatment protocol by a blinded physical therapist and nurse. Treatment sessions were provided by a separate, physical therapist who was unaware of their scores on several outcome measures. Following an initial assessment to determine eligibility and gather baseline results, participants were randomly allocated to one of three groups through computer-generated randomization. Participants were blinded to their group assignment, or they did not know if they were the placebo group until the end of the study. Outcomes were measured at baseline and immediately following the 12-week treatment. A *P* value of .05 was considered statistically significant in this study. It should be noted that researchers opted to only analyzed participant data who completed the full study protocol. Additionally, they found their data to have a nonnormal distribution, so they opted to perform nonparametric analyses, so outcomes were reported using median and ranges.

Setting

[e.g., locations such as hospital, community; rural; metropolitan; country]

Rehabilitation and data collection occurred at a neurology clinic associated with the Universidade Estadual de Campinas in Campinas, Brazil.

Participants

[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]

Note: This is not a list of the inclusion and exclusion criteria. This is a description of the actual sample that participated in the study. You can find this descriptive information in the text and tables in the article.

113 women met the inclusion criteria but did not enroll because of an inability to attend treatment sessions (n=52), lack of interest (n=17), and unwillingness to undergo an assessment (n=14). A total of 30 women were enrolled in the study, 10 randomized to one of three groups. However, only 25 completed the study. 5 women did not complete the study after enrolment. 1 subject allocated to group 3 withdrew because she was unwilling to perform the treatment. Two subjects from groups 1 and 2 withdrew because they were not able to attend the twice-weekly treatment sessions. Two more subjects in groups 1 and 2 withdrew because they experienced an exacerbation of their MS, meaning they no longer met the eligibility criteria based on severity functional impairments. Eligibility criteria were women 18 years or older; with a diagnosis of relapsing-remitting MS; who were ambulatory with only mild functional impairments; had adequate cognitive capacity; were experiencing lower urinary tract symptoms (as evidenced by a score on the Overactive Bladder Questionnaire); and were able to contract their pelvic floor muscles (PFMs). Participants were excluded if they were pregnant; had undergone previous gynecologic, urologic, and/or neurologic surgery; had pelvic organ prolapse, urinary tract infection, or were perimenopause or menopause based on self-reporting. For all three groups, ages varied from 42 to 52 years. The median time since their MS diagnosis varied from 11 to 15 years and the median duration of LUTS varied from 4 to 4.9 years.

Intervention Investigated

[Provide details of methods, who provided treatment, when and where, how many hours of treatment provided]

Control

All participants underwent treatment for 12 weeks, twice a week at 50 minutes a session. Sessions were completed with a licensed physical therapist who did not perform the initial PFM assessment. Group 1 was considered the placebo group and underwent PFMT using EMG feedback with sham NMES. The sham NMES parameters included surface electrodes placed over the sacrum with a pulse width of 50 milliseconds at a frequency of 2 Hz. The stimulation time was 2 seconds on followed by 60-seconds of rest between stimuli for 30 minutes total. On page 2, researchers reported that these parameters are known to result in "no physiological effect". Following sham NMES, participants were instructed on how to perform a pelvic floor muscle contraction without co-contraction of the gluteal or hip musculature. This instruction was duplicated for the other treatment groups. Each treatment session included 30 slow maximal effort PFM contractions, following by 3 minutes of fast maximal effort PFM in supine. Fast contractions involved 3-second contractions followed by relaxation for 6 seconds until 3 minutes had passed. Pelvic Floor Muscle exercises were reviewed

weekly. Participants were instructed to perform the PFM exercises 3 times daily at home without the use of biofeedback. EMG feedback was provided through a vaginal probe to assist with contraction and relaxation.

Experimental (2 experimental groups)

Group 2 received PFMT with EMG biofeedback and intravaginal NMES. NMES was applied using an intravaginal probe. Parameters for stimulation involved a width of 200 microseconds, at a frequency of 10 Hz for 30 minutes to the participant's maximum tolerated intensity. Following the intravaginal NMES protocol, the participants received the same PFMT as previously discussed in group 1.

Group 3 received PFMT with EMG biofeedback and TTNS. Self-adhesive electrodes were placed below the left medial malleolus and 5 cm superior to the distal electrode. The stimulation parameters for TTNS involved a pulse width of 200 microseconds at a frequency of 10 Hz for 30 minutes, with amplitude adjusted to a level just below the threshold for motor contraction. Following the TTNS protocol, the participants received the same PFMT as previously discussed in group 1.

Outcome Measures

[Give details of each measure, maximum possible score and range for each measure, administered by whom, where]

This study looked at several outcome measures. Two outcome measures were performed directly following the first meeting which includes a 24-hour pad test (used to quantify leakage experienced in 24 hours) and a 3-day bladder diary (time of diurnal and nocturnal micturition, episodes of urgency, urinary incontinence, hesitancy, and incomplete bladder emptying). At the second visit, a PFM assessment and urodynamic study were performed by a blinded physiotherapist and nurse, respectively. The PFM assessment involved the assessment of contractile power, endurance, repetitions, and the number of fast contractions with every contraction timed of the pelvic floor. The PFM assessment also involved PFM tone, the flexibility of the vaginal opening, and the ability to relax the PFMs following a contraction. The entire PFM assessment was achieved through digital palpation. The urodynamic studies assessed for maximum bladder capacity, maximum detrusor contraction, maximum flow rate, detrusor pressure at maximal contraction, and post-residual volume. Participants also completed three questionnaires: the overactive bladder questionnaire (OAB), International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF), and Qualiveen instrument. The OAB is a self-report questionnaire that asks participants to rate how bothered they are by symptoms of voiding frequency, urgency, nocturia, and urge incontinence. The OAB is scored on a 6-pt Likert scale with 0 meaning unbothered and 5 meaning bothered a great deal. The ICIQ-SF includes three items that assess the daytime frequency and severity of urine loss. Scores on the ICIQ-SF range from 0 to 21, where higher scores indicate a higher impact of lower urinary tract symptoms on quality of life. The Qualiveen instrument assesses the quality of life related to the impact of urinary problems and general quality of life. Outcome measures were performed before and after the 12-week intervention by blinded investigators.

Main Findings

[Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. Use a table to summarize results if possible.]

Table 1. Lower Urinary Tract Symptoms based on 3-Day Bladder Diary

Symptoms	Baseline (G1)	12 Week (G1)	Baseline (G2)	12 Week (G2)	Baseline (G3)	12 Week (G3)	*P*
Frequency	7.8 (6.7-11.7)	7.5 (6.7-9)	8.5 (6.7 – 11.7)	7.8 (6.3-8.7)	9.3 (5.7 – 11.3)	7.7 (7-9.7)	.78
Urgency	3.7 (2.7 – 5.7)	2 (0.7-3)*	4 (2.7-6.7)	1.3 (0.3-2)*	3.7 (2.7-7.3)	1.7 (0.3-3)*	.84
Urge urinary incontinence	3 (1.7 – 6.3)	0.5 (0-3)*	5 (0-8.3)	0.2 (0 – 2.3)*	4.0 (1.7 – 5.7)	0.7 (0-4.3)*	.83
Nocturia	2 (0 – 4.3)	0 (0-2)	2.5 (0-6)	0 (0 – 2)*	2.0 (0-4.3)	0 (0 – 1.3)*	.87
Hesitancy	2 (0-3.3)	0.5 (0-3.7)	1.8 (0-4.3)	0 (0 – 0.7)*	2.3 (0-3.7)	1 (0-3)*	.47
Incomplete emptying	2.7 (0 – 4.7)	1.2 (0-4.3)	2.7 (0-5)	1 (0 – 3.3)*	3 (0 – 6.3)	1.3 (0 – 5)*	.89

G1 = group one, pelvic floor muscle training and sham NMES. G2 = group two, pelvic floor muscle training and intravaginal NMES. G3 = group three, pelvic floor muscle training and TTNS. Scores are values of median and range. * indicates statistically significant differences following treatment.

Participants in G1 (PFMT with sham NMES) significantly improved from baseline for urgency and urge urinary incontinence. Participants in G2 (PFMT with intravaginal NMES) significantly improved from baseline for urgency, urge urinary incontinence, nocturia, hesitancy, and incomplete emptying. Participants in G3 (PFMT with TTNS) significantly improved from baseline in urgency, urge urinary incontinence, nocturia, hesitancy, and incomplete emptying. However, there were no significant differences between the groups.

Table 2. Pelvic Floor Function

	Baseline (G1)	12 Week (G1)	Baseline (G2)	12 Week (G2)	Baseline (G3)	12 Week (G3)	*P*
Power	2 (1 – 3)	2.5 (2-4)*	2 (1-3)	3 (2 – 5)*	2 (2-3)	3 (3-4)*	.64
Endurance	2 (1 - 4)	8 (5-10)*	2 (1-4)	10 (5-10)*	3 (2-5)	8 (5-10)*	.73
Dynamic Endurance	3 (1 – 4)	10 (6 – 10)*	3 (2-4)	10 (7-10)*	2 (2-5)	10 (7-10)*	.48
Fast contractions	3 (2 – 5)	10 (7 – 10)*	3 (2-5)	10 (7-10)*	3 (2-6)	10 (10-10)*	1.00

G1 = group one, pelvic floor muscle training and sham NMES. G2 = group two, pelvic floor muscle training and intravaginal NMES. G3 = group three, pelvic floor muscle training and TTNS. Scores are values of median and range. * indicates statistically significant differences between baseline and post-treatment.

Participants in all three groups significantly improved from baseline in power, endurance, dynamic endurance, and fast contractions. However, there were no significant differences between the groups.

Table 3. Pelvic Floor Muscle Tone, Flexibility, and Ability to Relax

	Baseline (G1)	12 Week (G1)	Baseline (G2)	12 Week (G2)	Baseline (G3)	12 Week (G3)	*P*
Pelvic floor muscle tone	2 (0 – 3)	1 (0-2)[a]	2 (0-3)	0 (0-1)*	2 (1-3)	1 (1-2)[b]	.01
Flexibility	3 (1-4)	3 (2-4)[a]	3 (2-4)	4 (3-4)*	2 (2-3)	3 (2-4)[b]	.01
Ability to relax pelvic floor muscles	1.5 (0-2)	1 (0-2)[a]	2 (0-3)	0 (0-1)*	2 (1-2)	1 (0-2)*[b]	<.01

G1 = group one, pelvic floor muscle training and sham NMES. G2 = group two, pelvic floor muscle training and intravaginal NMES. G3 = group three, pelvic floor muscle training and TTNS. Scores are values of median and range. * indicates statistically significant differences. [a] indicates statistically significant differences between G2 and G1 (*P= .03* for pelvic floor muscle tone, *P=.01* for flexibility, and *P=.01* for ability to relax). [b] indicates statistically significant differences between G2 and G3 (*P<.01* for pelvic floor muscle tone, *P<.01* for flexibility, and *P<.01* for ability to relax).

Participants within G2 had greater PFM tone, flexibility of the vaginal opening, and ability to relax the PFMs than participants within G1 and G3.

On page 4 the authors state, "All three groups achieved significant reductions in median OAB scores following treatment (G1: *P<.01;* G2: *P = .01;* G3: *P =.01).* However, group 2 improved more than group 1 *(p <.01)* and group 3 *(P<.01).* Also, all groups decreased in terms of ICIQ-SF scores *(*G1 and G2*: p=.02,* G3*: P=.01)*, but there were no statistically significant differences among the groups."

Table 4. Mean, SD, and Effect Size Calculations

Outcome Measure	Calculated Mean ± SD	Calculated Effect Size
Baseline Urge urinary frequency for G1	3.5 ± 1.85	1.04

12 Week Urge Urinary Frequency for G1	1 ± 0.3	
Baseline Urge urinary frequency for G2	4.58 ± 3.34	0.54
12-week Urge Urinary Frequency for G2	0.675 ± 6.59	
Baseline Urge urinary frequency for G3	3.85 ± 1.34	1.08
12-week Urge urinary frequency for G3	1.43 ± 1.69	

G1 = group one, pelvic floor muscle training and sham NMES. G2 = group two, pelvic floor muscle training and intravaginal NMES. G3 = group three, pelvic floor muscle training and TTNS.

The mean was calculated using the following equation: $x = \frac{a+2m+b}{4}$. The standard deviation was calculated using the following equation: $s^2 = \frac{1}{12}\left[\frac{(a-2m+b)^2}{4}+(b-a)^2\right]$. These equations were determined as the best estimators for the mean and standard deviation for studies where not all the information is available and/or reported.[11] Effect size was calculated using the following Cohen's d equation: $d = \frac{M_{12}-M_b}{SD_{pooled}} \times \left(\frac{N-3}{N-2.25}\right) \times \sqrt{\frac{N-2}{N}}$ to account for the smaller sample size.

Original Authors' Conclusions

[Paraphrase as required. If providing a direct quote, add page number]

On page 5 the authors stated that "Findings suggest that PFMT alone or in combination with intravaginal NMES or TTNS alleviates LUTS in women with MS including frequency of urge and urge urinary incontinence episodes". PFMT when combined with intravaginal NMES led to greater improvements in PFM tone, the flexibility of the vaginal opening, and the ability to relax after a contraction when compared to TTNS and PFMT alone. TTNS appeared to have no additional benefit when compared to PFMT alone.

Critical Appraisal

Validity

[Summarize the internal and external validity of the study. Highlight key strengths and weaknesses. Comment on the overall evidence quality provided by this study.]

This level 1b, prospective randomized clinical trial by Lúcio et al. has fair quality based on the PEDro scale score of 5/10 as a risk of bias tool. As mentioned previously, the heterogeneity of this patient population combined with the use of hands-on treatment makes it extremely difficult to blind all investigators, participating therapists, and participants. Therefore, a score of 5/10 on the PEDro scale is a strong score for this study and patient population. A strength of this study is the blinding of the investigators performing the outcome assessments as well as the blinding of participants. Additionally, the investigators used a separate therapist for the treatment sessions who was blinded to the participant's baseline results. Another strength of this study was the use of a placebo or control group, so one can accurately compare the use of PFMT alone to PFMT with two different kinds of electrical stimulation. Despite these strengths, this study does have some significant weaknesses. The first is the statistical analysis only included measures at baseline and immediately following treatment, so there is no way to determine the long-term effects of this intervention for the patient population. Due to smaller sample sizes, the authors opted to report their data using nonparametric statistical analyses to account for nonnormal distributed data. Because authors utilized a nonparametric statistical analysis, values for outcome measures were in median and ranges, rather than mean and standard deviations. This reporting makes it difficult to compare to other studies. Additionally, the validity of the data is questionable as the authors did not report quantitative data such as effect size. As seen in Table 4 of the "Main Findings" section for this study, when the mean, standard deviation, and effect size are calculated there appear to be considerably large treatment effect sizes (especially for the PFMT only group and PFMT with TTNS). However, given the extremely small sample sizes for each treatment group (10) the effect sizes should be interpreted with caution. The authors also did not include an "intention-to-treat" analysis, which further decreased the sample size included in their statistical analysis due to participant drop-outs. Lastly, the participants across all three groups were similar in terms of age, parity, body mass index, time since diagnosis of MS, and duration of LUTS. These similarities limit the applicability of these results and overall external validity given the true heterogeneity of this patient population.

Interpretation of Results

[This is YOUR interpretation of the results taking into consideration the strengths and limitations as you discussed above. Please comment on clinical significance of effect size / study findings. Describe in your own words what the results mean.]

I think the strongest evidence that emerged from the Lúcio et al. study related to my clinical question is the changes from baseline to post-treatment for urge urinary frequency in all three groups. The calculated effect sizes for G1 (PFMT + sham NMES) and G3 (PFMT + TTNS) were significantly large at 1.04 and 1.08, respectively. The calculated effect size for G2 (PFMT + IVES) was smaller at 0.54 which is surprising as authors found that participants in G2 showed greater improvements overall in various parameters including PFM tone, PFM flexibility, and PFM relaxation compared to the other treatment groups. What is important to note in this study, is that PFMT was a treatment parameter for all three groups and each group showed improvements in PFM contractile power, endurance, dynamic endurance, and fast contractions. However, I am weary of the large effect sizes within this study given the exceptionally small sample size used. Because the authors did not use an intention-to-treat analysis, sample sizes utilized for statistical analysis were even smaller than the original sample sizes reported. Despite authors concluding on page 5 that PFMT alone or PFMT + intravaginal NMES is effective in reducing the frequency of urgency and urinary incontinence episodes in women with MS, I think caution should be taken when applying these findings in clinical scenarios. I believe a larger sample size is needed to determine a more representative effect of PFMT and PFMT plus electrical stimulation in women with MS and urinary incontinence.

Applicability of Study Results

[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.]

The results of this study are extremely applicable to my initial clinical question, but only somewhat applicable to the inspired clinical scenario. In this study, participants had been diagnosed with MS 11 to 15 years prior, with LUTS symptoms beginning 4 to 4.9 years before the study. It's been estimated that patients with MS commonly experience moderate-to-severe pelvic floor symptoms with 41% reporting bladder involvement.[12] Given the high rate of pelvic floor symptoms in this patient population, it is important to know that patients with this neurological diagnosis may also benefit from PFMT and PFMT combined with electrical stimulation. However, given that the clinical scenario involved a female patient with an SCI, the results of this study do not directly apply to the clinical scenario. Researchers found that PFMT with or without electrical stimulation led to improvements in urge urinary incontinence. Additionally, they found that when PFMT is combined with intravaginal neuromuscular electrical stimulation, women with MS may also experience significant improvements in PFM tone, flexibility, and relaxation. As previously discussed, personalized equipment (probe) is required to utilize intravaginal electrical stimulation which may be a barrier for many individuals depending on their financial status and insurance provider. Depending on the level of motor involvement, placement of the probe may be difficult for certain neurologic diagnoses. Although the feasibility of implementing a program with IVES for patients with MS is simple and is easily combined with a PFMT program, considerations should be made to the financial investment and accessibility of this treatment option for patients with MS experiencing urinary incontinence. Lastly, given the extremely small sample sizes and homogeneity of the participants, extreme caution should be taken when applying these results to a clinical scenario in a more heterogeneous patient population.

SYNTHESIS AND CLINICAL IMPLICATIONS

[Synthesize the results, quality/validity, and applicability of the two studies reviewed for the CAT. Future implications for research should be addressed briefly. Limit: 1 page.]

Both studies included in this CAT indicate that PFMT can improve symptoms related to urinary incontinence as a result of an injury or diagnosis affecting the nervous system. In some patient populations, such as in MS, the addition of intravaginal neuromuscular electrical stimulation may further enhance the improvements seen with PFMT whereas individuals with SCI likely will not benefit from added electrical stimulation. The first study included in this CAT by Elmelund et al. is extremely relevant to the clinical question and scenario as all participants were females with incomplete spinal cord injuries all ranging in severity and injury levels. Findings from the Elmelund et al. study suggest that women with an incomplete SCI who receive PFMT alone will experience significant improvements in the number of daily urinary incontinence episodes as well as the perceived impact of urinary incontinence on quality of life. However, the addition of intravaginal electrical stimulation to a PFMT program does not result in enhanced improvements. These findings suggest that if a female with an incomplete spinal cord injury is experiencing urinary incontinence, PFMT alone should be considered as an accessible and feasible treatment option. Overall, the Elmelund et al. study has fair quality and can be easily applied to a variety of patient scenarios, however, due to the difference between groups at baseline and small sample size, the degree of improvement following PFMT may be minimal in this patient population. Future randomized controlled trials are needed that compare PFMT, PFMT + IVES, and placebo with significantly larger sample sizes to better determine the impact of treatment in this patient population.

The study by Lúcio et al. found differing results from Elmelund et al. in women with MS. Their findings suggest that PFMT will enhance urinary incontinence in women with MS, but these effects are significantly enhanced when PFMT is combined with IVES. However, the validity of this data is questionable since the authors did not report quantitative data such as effect size, utilized extremely small sample sizes, and analyzed data with a nonparametric approach. Additionally, participants were extremely similar demographically which is not representative of this heterogeneous patient population. Therefore, future randomized controlled trials are needed for this patient population with a significantly larger, and more representative sample size.

Based on the two studies described above, I conclude that PFMT is a safe and feasible treatment approach for women with urinary incontinence as a result of an injury or neurological diagnosis affecting the nervous system. It appears that in women with incomplete spinal cord injuries and MS, PFMT leads to objective and subjective improvements related to pelvic floor muscle function, frequency of urinary incontinence, and impact of urinary incontinence on quality of life. Due to the weaknesses of the reviewed studies, the degree of improvement may vary when this treatment approach is utilized in clinical scenarios. Additionally, there are mixed, and inconclusive findings related to the use of combined PFMT with intravaginal electrical stimulation for urinary incontinence in these patient populations. Therefore, at this time, I do not recommend the use of intravaginal electrical stimulation for urinary incontinence in women with SCI or MS. The best advice for the patient, in this case, is to pursue PFMT with a licensed pelvic floor physical therapist before considering pharmacological or surgical interventions.

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