







Appendix 1: The methods of electrode placement

Electrode location	Electrodeposition method/ Number of studies	
<p>Point A: 3-5 cm above the med malleolus or ankle (width of 3 fingers)</p> <p>Point B: less than 3 cm above the medial malleolus</p>	<p>Method 1 _AC 14 studies</p>	
<p>Point C: Around the medial malleolus</p> <p>Point D: More than or equal to 5 cm above the med malleolus</p>	<p>Method 2 _BC 6 studies</p>	
<p>Point E: On the arch of the foot in the middle part of the sole in the heel bone</p> <p>Point N: Related to unknown points etc. in the path of the tibial nerve in the leg</p>	<p>Method 3 _AE 10 studies</p>	
	<p>Method 4 _BE 4 studies</p>	
	<p>Method 5 _DC 10 studies</p>	
	<p>Method 6 AN, BN, CE,BD, EE 17 studies</p>	

Appendix 2a: Summary of studies

Row	Author , year and reference	Result
1	Mathieu 2017(58)	The visual analog scale (VAS) score above 50% showed no significant difference between the diabetic group (70% vs. 44.1%, $p=0.17$) and the two groups (4.10 vs. 4.10, $p=0.98$). After two months of treatment, the score on the urinary symptoms profile (USP) questionnaire reduced significantly in both groups (-3 scores in the diabetic group, -1.9 scores in the non-diabetic group, $p=0.030$ and $p<0.001$, respectively). Except for the patients whose treatment was stopped after 6 months, there was no significant difference between groups. This difference was greater among diabetic patients (100% vs. 63.5%, $p=0.04$). The functional results of the TTNS in the OAB treatment seem to be similar between the diabetic and non-diabetic patients.
2	Ragab 2015 (68)	At the end of the treatment, the VAS score and daily voiding frequency rate reduced and the mean urine volume increased. There was no statistically significant difference in the ICPI scores ($p=0.927$) between weeks 0, 6, and 12 ($p=0.937$). As regards the GRA score, 85% of patients reported having no effect, 5% reported having worse symptoms, and 10% reported having a mild good response. Intermittent PTNS is not a satisfactory treatment for refractory IC/BPS.
3	Van balken 2003 (46)	A subjective response was observed in 42% of patients. The mean VAS score was less than 3 in 21% of patients. The 36-item Short Form Health Survey questionnaire (SF-36) showed the overall pain intensity to have a significant improvement. Despite the very low overall success rate and the need for controlled studies with placebo, PTNS may have a place in the treatment of patients with chronic refractory pelvic pain.
4	Rio-Gonzalez 2017 (51)	The data confirmed the high effectiveness of PTNS in improving the OAB symptoms by 24 months. Moreover, frequent urination during the day and the first sensation of bladder filling are considered important factors in the PTNS success.
5	AMARENCO 2003 (47)	The PTNS has an objective effect on urodynamic parameters. Improvement of OAB caused the PTNS to be suggested as a non-invasive therapeutic method at the bedside.
6	Klingler 2000 (55)	Pain (VAS) is reduced in patients. The urodynamic evidence of bladder instability faded in 76.9% of patients. The average total bladder capacity (TBC) and bladder volume during voiding increased in all patients. No side effects were observed in treatment. Peripheral neuromodulation of the S3 region can treat patients with urgency-frequency in OAB syndrome.
7	De Gennaro 2004 (50)	The pain VAS score decreased. Most cases of urinary incontinence were cured. The symptoms improved in 71% of the children with urinary retention. In 65% of patients who regained bladder control, the cystometric capacity of the bladder was normal and there were no more unstable contractions. No significant change was observed in the urodynamic and symptoms in the neuropathic bladder group. The PTNS is safe, minimally painful and feasible in children. PTNS seems to be helpful in the treatment of refractory nonneurogenic LUTS.
8	MacDiarmid 2010 (56)	Patients showed improvement in overall subjective response, frequency of daily voiding and urge incontinence. A significant improvement was observed in the OAB questionnaire symptoms severity from 3 months to 12 months ($p<0.01$), as well as from 6 months to 12 months ($p<0.01$). The mean voiding volume improvement was 39 cc ($p<0.05$). No significant side effect was observed. The OAB symptoms improved significantly with 12 weeks of PTNS treatment sessions and this improvement lasted for up to 12 months. The results of this study indicate the effectiveness of PTNS as a stable and long-term treatment in OAB.
9	Onal 2012 (59)	There was a significant reduction in urinary frequency, urgency, urge incontinence, and the pad test score, and an increase in the patient's fluid intake. Despite its positive effects on bladder diary, pad test, and QOL in OAB syndrome, PTNS has no effects on bladder circulation.
10	Vanbalken 2001(46)	There was a statistically significant reduction in the frequency of urine leakage, number of pads, and frequency of urine voiding. The QOL of patients, especially patients with OAB improved. The mean volume of urine voided showed a statistically significant increase. Only mid-side effects were observed. The PTNS is a successful therapeutic non-invasive method for patients with certain types of lower urinary tract dysfunction.
11	Peters 2012 (28)	There was a significant improvement in urinary frequency, urge incontinence frequency, urinary emergency, and in the scores of symptoms severity and QOL of OAB and health-related questionnaire. Some mild side effects of unknown relationship to treatment were reported. PTNS with 1.3 treatments per month is a long-term safe, durable and valuable therapeutic method to significantly maintain the clinical control of the OAB symptoms.
12	Van Balken,et al 2006 (62)	Sexual dysfunction is observed in most of the patients with lower urinary tract dysfunction, which may be improved in the recent successful treatment.
13	Zhao 2004 (70)	No significant change was observed in the pain scores, urine voiding frequency, urine volume, and the scores of ICPI, ICSI, and SF-36. However, an improvement was observed in some patients. The treatment had no side effects. Intermittent PTNS has no significant clinical effect on patients with refractory IC during 10 weeks.
14	van der Pal 2006 (63)	After stopping treatment for 6 weeks, the frequency and severity of incontinence worsened significantly ($p<0.05$). After retreatment, the number of incontinence episodes, incontinence severity, as well as the QOL improved significantly ($p<0.05$). The mean voided volume was significantly worsened and it was significantly improved during the retreatment period ($p<0.05$). Continued treatment is considered necessary in OAB patients who have been successfully treated with PTNS. The PTNS can be made effective again in patients who have already been successfully treated.
15	Yoong 2013	Daily incontinence frequency and daily urge incontinence frequency during 2 years were statistically similar to the recorded cases within 6 weeks and remained less than the baseline level. No side effects other than hypoesthesia were

	(65)	reported. Women who received PTNS for refractory OAB syndrome during 2 years, reported significant symptom relief. PTNS is an excellent safe durable therapeutic method in the second line of treatment.
16	Zhao 2008 (69)	No statistically significant improvement was observed in VAS. The scores of ICPI, ICSI, and SF-36 were improved significantly. No significant difference was observed in the diary index and SF-36 scores between the two groups and before and after treatment. Out of 18 patients, the bladder volume had a statistically significant improvement in 8 patients who evaluated the trial to be effective. All patients completed the 10 therapy sessions without any side effects. Intermittent PTNS may be an alternative therapy for patients with IC symptoms.
17	Baykal 2005 (66)	A significant improvement was observed in the maximum bladder capacity and pain symptoms. The intravesical heparin and peripheral neuromodulation combination seems to be an alternative for patients with refractory IC.
18	Govier 2001 (53)	The mean daily urine voiding and urge incontinence were reduced by 25% and 35%, respectively ($p < 0.05$). Statically significant improvements were observed in the pain and QOL indices. No significant side effects were observed in patients. Percutaneous peripheral afferent nerve stimulation is a safe, minimally invasive and effective therapy for treating refractory OAB and/or pelvic floor dysfunction.
19	van Balken 2006 (61)	Subjective success was seen in 51.5% of patients. The SF-36 total score was low. The patients also scored worse on the disease-specific QOL questionnaire, though the disease severity was not different. PTNS may be used as a tool for neuromodulation therapy in patients.
20	Capitanucci 2009 (49)	Twelve and all 14 patients with dysfunctional voiding were improved (p not significant). During 1 year of follow-up, the dysfunctional voiding was improved greater in OAB patients (71% vs 41%) and the improvement remained the same at the 2-year evaluation. The voided volume and post-void residual urine became normal in most of the patients with dysfunctional voiding. PTNS is reliable and effective for nonneurogenic refractory lower urinary tract dysfunction in children. The PTNS efficacy seems to be better in dysfunctional voiding cases than in the OAB ones.
21	Vandoninck 2003 (64)	The objective and subjective success rate was 56% and 64% in 24-hour leakages, respectively. Urine voiding frequency in terms of volume chart data and QOL scores improved significantly ($P < 0.01$). Cystometric bladder capacity ($p = 0.043$) and bladder volume ($p = 0.012$) increased significantly. PTNS cannot abolish Detrusor instability but it increases cystometric capacity and delays the onset of Detrusor instability. PTNS can be useful in the cystometry of patients without Detrusor instability or with late Detrusor instability onset.
22	Fischer-Sgrott 2009 (52)	The scores of the health-related questionnaire and ICIQ-SF were improved significantly. PTNS can be considered as a good alternative to OAB therapy because it is safe and inexpensive as compared to other therapeutic methods and improves the QOL in women with refractory OAB.
23	Marchal 2011 (71)	At 6, 12, and 24 months of follow-up, 92.4%, 91.69%, and 62.5% of patients improved, respectively. Night-time urination frequency ($P \leq .05$) and QOL ($P \leq .01$) were significantly worsened. By the end of therapy, the first sensation of bladder filling increased. The mean post-therapy bladder capacity increased by 72.7 mL ($P \leq .001$). PTNS is a good option for OAB therapy.
24	Pytel 2018(60)	According to the urinary diary, incontinence frequency, frequent urination, and tendency to urinate improved. Urodynamic examination showed no significant change in the target parameters. No side effects were observed. PTNS is an effective, minimally invasive, tolerable and safe therapy for OAB syndrome.
25	Kabay 2021 (67)	Daily urine voiding and daily emergency frequency decreased by 3.8 and 4.7 times, respectively, and pain intensity, symptoms, and problem index showed a statistically significant improvement. The changes in the mean volume of urine voided were not statistically significant. The voiding volume improved by 8.4 mL on average. In patients with painful bladder syndrome, the urine voiding diary, and scores of the ICSI, ICPI, and VAS improved after 12 weeks of PTNS treatment. The PTNS treatment is a useful therapeutic option in the first line of the treatment to improve the symptoms of the painful bladder syndrome.
26	Kizilyel 2015 (24)	All parameters of the urinary bladder improved significantly in all groups ($p < 0.05$). The use of PTNS compared to the drug group had a statistically significant improvement in symptoms. PTNS is a safe, simple and minimally invasive treatment method in patients with OAB and may be suggested alone or in combination with ACD if conventional treatments fail.
27	Preyer 2015 (30)	There was no significant difference between the two treatment groups in quality of life ($p = 0.07$) and frequency of incontinence ($p = 0.89$). Side effects of PTNS were less than tolterodine ($p = 0.04$). Both PTNS and tolterodine were effective in reducing the frequency of incontinence and improving the quality of life in patients with OAB, but not in the frequency of urination. PTNS had fewer side effects.
28	Ayala-Quispe 2020 (39)	Average voiding volume, daily and nightly voiding frequency decreased, urgency and urgency incontinence frequency decreased, there was no significant difference between the two treatments. The quality of life and recovery due to treatment with both techniques increased positively ($p = 0.05$). There were no complications. This was the first randomized clinical trial in Mexico that evaluated the efficacy of both posterior tibial stimulation techniques.
29	Sherif 2017 (34)	Botulinum toxin group had significant improvement in all parameters. Intrathecal injection of botulinum toxin and PTNS are both effective in the treatment of refractory idiopathic OAB. Botulinum toxin A is more effective than PTNS and is durable, less invasive, reversible and safe, but has more side effects.
30	Mallmann 2020 (25)	The overactive bladder questionnaire showed a significant improvement in the PTNS group compared to the parasacral stimulation group ($p = 0.019$). After the intervention, there was no difference between the groups in terms of the KHQ domain, the average symptom scale of this questionnaire, and the proportion of the incontinence severity index. Both parasacral cutaneous electrical stimulation and PTNS appear to be effective and safe for home treatment of women with OAB.
31	Elshora 2020 (18)	Urodynamic parameters and OAB symptoms had a statistically significant improvement, there was no significant difference between the two groups. Side effects were mainly observed in the tiroprium chloride group, which were not observed in the PTNS group. Tiroprium chloride and PTNS stimulation have the same effect in treating OAB symptoms and these two lines of treatment are effective. PTNS is safe and associated with significant improvement in OAB symptoms.

32	Lashin 2021 (40)	Bladder symptoms, frequency and frequency of emergency urinary incontinence had statistically significant improvement. No serious device-related adverse events or malfunctions were reported. PTNS is safe and effective in treating OAB symptoms after 6 weeks. This is more acceptable and affordable for patients.
33	Vecchioli-Scaldazza 2018(37)	PTNS showed more effectiveness than solifenacin succinate, but together with PTNS, it was more effective than its individual application and showed more effectiveness in the long term..
34	Sonmez 2022 (42)	The severity of incontinence, voiding frequency, frequency of incontinence, number of pads used, severity of symptoms and quality of life of the groups receiving posterior tibial nerve stimulation were significantly improved compared to the group receiving bladder retraining ($P < 0.0167$). Treatment success and treatment satisfaction were higher in both electrical stimulation groups than in the bladder retraining group ($P < 0.001$ and $P < 0.0167$, respectively). Posterior tibial nerve stimulation with bladder training was more effective than bladder training alone in women with idiopathic OAB .These two tibial nerve stimulation methods had similar clinical efficacy, but with minor differences, TTNS had shorter preparation time, lower discomfort level, and higher patient satisfaction than PTNS.
35	Svihra 2002 (36)	In the electrical stimulation group, the average of the incontinence questionnaire increased. There was a significant difference in the drug group. The untreated group saw no change in complaints. Noninvasive stimulation improved subjective symptoms related to overactive bladder, had no side effects, and was well tolerated.
36	Karademir 2005 (23)	In both groups, the average voiding frequency, urgency and urgency incontinence improved. There was no significant difference between the two groups. SANS is an easy treatment method with few complications in OAB. The combination with a low dose of anticholinergic, without causing side effects, significantly increases the success rate.
37	Zonić-Imamović 2021(44)	TTNS and PTNS led to reduction of all clinical symptoms of OAB and significant improvement of quality of life ($P < 0.05$), without side effects, which was statistically more significant with PTNS ($P < 0.001$). Better effects were obtained with weekly PTNS.
38	Geirsson1993 (45)	Urinary frequency, average and maximum voided volume, and visual analog scale scores of both groups had no difference compared to before treatment. Despite the small sample size, it seems that TTNS and acupuncture have a very limited effect in patients with interstitial cystitis.
39	Boudaoud 2015(15)	Objectively, the results support the effectiveness of TTNS. Evacuation volume (184 ml to 265 ml), maximum cystomanometric volume (215 ml to 274 ml) increased significantly. Clinical results remained the same between TTNS and placebo groups. Despite the small sample size, this pediatric population emphasizes the placebo effect with any treatment.
40	Macías-Vera 2016 (57)	Patients treated with darifenacin had a decrease in voiding frequency and incontinence, and compared to patients treated with stimulation, they had a lower score in the self-assessment questionnaire of quality of life. In the pad test, urine leakage in grams decreased in both groups and there was no statistically significant difference between the two groups ($p = 0.753$). At week 6, darifenacin was superior to transcutaneous stimulation in reducing symptoms, urinary leakage, and questionnaire scores.
41	Souto 2014 (35)	In the 24th week, in the multimodal treatment group, the score of the OAB Incontinence Questionnaire (ICIQ-OAB), $p = 0.0001$, and the score of the Short Form Incontinence Questionnaire (ICIQ-SF), $p = 0.0006$, increased. Multimodal treatment was more effective and TENS treatment (alone or combined) has more lasting results than oxybutynin alone.
42	Manriquez 2016 (26)	A significant decrease was observed in the voiding frequency, urgency and frequency of emergency incontinence. There was no significant difference between the intervention groups. OAB-q scores improved similarly in both groups. TTNS and oxybutynin showed similar improvements in subjects with OAB in a 12-week study.
43	Ramirez-Garcia 2021 (32)	Statistically significant improvements were observed in OAB-q-SF and incontinence questionnaire, as well as in the quality of life of both TTNS and PTNS groups ($p < 0.001$). There was no difference between the two groups. Therefore, these findings, along with the minimal invasiveness and ease of use of TTNS, may lead to an increase in the use of this technique in OAB.
44	Abulseoud 2018(10)	The average score of the OAB symptom questionnaire, the average voiding frequency, and the IIQ-7 score in both TTNS and TTNS plus drug groups had a significant decrease. Cystometric capacity increased in both groups. TTNS combined with low-dose tiroprium chloride was more effective than TTNS alone in treating OAB in women.
45	Hegazy 2014 (54)	The mental success rate was 67% in the PTNS group and 40% in the propiorin group. PTNS is more effective than proprin in the treatment of OAB.
46	Bacchi 2021 (14)	Significant reduction of 1.5 times urination in group 2, which was not clinically relevant. Adding vaginal stimulation to TTNS for treating OAB was not more effective than TTNS alone.
47	Ebid 2009 (17)	In both groups, the parameters of daily urination, severity of urgency and VAS had statistically significant improvements. In the PTNS group along with pelvic floor exercise, the volume of the initial tendency to void was a continuous recovery. No difference was observed in the long-term electrical stimulation of the posterior tibial nerve with vetrospium hydrochloride in the treatment of patients with OAB. Discontinuation of both treatments resulted in further worsening of symptoms of OAB.
48	Finazzi-Agro 2010(19)	The improvement of incontinence frequency, number of voids, volume of voids, and incontinence quality of life score was significant in PTNS, but not in the placebo group. PTNS can be considered an effective treatment for detrusor overactivity incontinence, none of the placebo-treated patients responded to the treatment.
49	Barroso 2013 (48)	The visual analog scale was completely resolved in 70% of the parasacral stimulation group and in 9% of the PTNS group ($p = 0.02$). There was no significant difference between the groups ($p = 0.55$). Parasacral electrical stimulation is more effective in relieving symptoms of OAB, which is consistent with parents' opinion. However, there was no statistically significant difference in the assessment of symptoms of inefficient urination, or in the complete resolution of daily urinary urgency or incontinence.
50	Sancaktar 2010 (33)	Side effects were similar between the two groups. The combination of SANS and antimuscarinic therapy compared to antimuscarinic therapy alone in patients with overactive bladder led to better clinical results and Incontinence Impact Questionnaire (IIQ-7) scores.
51	Ramirez-Garcia2019	The number of daily urination and symptom improvement of the 3-day diary variables of urination in both stimulation methods did not decrease statistically significantly. In each method, more than 50% of the frequency of emergency

<p>The visual analog scale (VAS) score above 50% showed no significant difference between the diabetic group (70% vs. 44.1%, p=0.17) and the two groups (4.10 vs. 4.10, p=0.98). After two months of treatment, the score on the urinary symptoms profile (USP) questionnaire reduced significantly in both groups (-3 scores in the diabetic group, -1.9 scores in the non-diabetic group, p=0.030 and p<0.001, respectively). Except for the patients whose treatment was stopped after 6 months, there was no significant difference between groups. This difference was greater among diabetic patients (100% vs. 63.5%, p=0.04). The functional results of the TTNS in the OAB treatment seem to be similar between the diabetic and non-diabetic patients.</p>	NM	2	20	NM	0.15	P	NM	NM	7*8=56	71	TTNS		NRCT OAB		Mathieu 2017 (58)		1
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At the end of the treatment, the VAS score and daily voiding frequency rate reduced and the mean urine volume increased. There was no statistically significant difference in the ICPI scores (p=0.927) between weeks 0, 6, and 12 (p=0.937). As regards the GRA score, 85% of patients reported having no effect, 5% reported having worse symptoms, and 10% reported having a mild good response. Intermittent PTNS is not a satisfactory treatment for refractory IC/BPS.	1	1	30	NM	NM	P	NM	NM	1*12=12	20	PTNS		NRCT PB	Ragab 2015 (68)	2
A subjective response was observed in 42% of patients. The mean VAS score was less than 3 in 21% of patients. The 36-item Short Form Health Survey questionnaire (SF-36) showed the overall pain intensity to have a significant improvement. Despite the very low overall success rate and the need for controlled studies with placebo, PTNS may have a place in the treatment of patients with chronic refractory pelvic pain.	1	4	30	9	0.2	P	0-10	20	1*12=12	33	PTNS		NRCT PB	Van balken 2003 (46)	3
The data confirmed the high effectiveness of PTNS in improving the OAB symptoms	1	6	30	9	0.2	NM	NM	20	14	200	PTNS		NRCT OAB	Rio-Gonzalez 2017 (51)	4

by 24 months. Moreover, frequent urination during the day and the first sensation of bladder filling are considered important factors in the PTNS success.															
The PTNS has an objective effect on urodynamic parameters. Improvement of OAB caused the PTNS to be suggested as a non-invasive therapeutic method at the bedside.	1	5	NM	NM	200	M	NM	NM	NM	44	TTNS		NRCT OAB	AMARENCO 2003 (47)	5
Pain (VAS) is reduced in patients. The urodynamic evidence of bladder instability faded in 76.9% of patients. The average total bladder capacity (TBC) and bladder volume during voiding increased in all patients. No side effects were observed in treatment. Peripheral neuromodulation of the S3 region can treat patients with urgency-frequency in OAB syndrome.	1	2	30	9	0.2	M	0.5-10	20	4*12=48	15	PTNS		NRCT OAB	Klingler 2000 (55)	6
The pain VAS score decreased. Most cases of urinary incontinence were cured. The symptoms improved in 71% of the children with urinary retention. In 65% of patients who regained bladder control, the cystometric capacity of the bladder was normal and there were no more unstable contractions. No	1	6	30	NM	0.2	M	0-10	20	1, 6 ,12	10	PTNS		NRCT OAB	De Gennaro 2004 (50)	7

<p>significant change was observed in the urodynamic and symptoms in the neuropathic bladder group. The PTNS is safe, minimally painful and feasible in children. PTNS seems to be helpful in the treatment of refractory nonneurogenic LUTS.</p>															
<p>Patients showed improvement in overall subjective response, frequency of daily voiding and urge incontinence. A significant improvement was observed in the OAB questionnaire symptoms severity from 3 months to 12 months ($p < 0.01$), as well as from 6 months to 12 months ($p < 0.01$). The mean voiding volume improvement was 39 cc ($p < 0.05$). No significant side effect was observed. The OAB symptoms improved significantly with 12 weeks of PTNS treatment sessions and this improvement lasted for up to 12 months. The results of this study indicate the effectiveness of PTNS as a stable and long-term treatment in OAB.</p>	1	3	30	NM	NM	NM	0.5-9	20	1*12=12	33	PTNS	NRCT OAB	MacDiarmid 2010 (56)	8	
<p>There was a significant reduction in urinary frequency, urgency, urge incontinence, and</p>	1	6	30	NM	0.2	M	0.5-10	20	1*12=12	18	PTNS	NRCT OAB	Onal 2012 (59)	9	

the pad test score, and an increase in the patient's fluid intake. Despite its positive effects on bladder diary, pad test, and QOL in OAB syndrome, PTNS has no effects on bladder circulation.															
There was a statistically significant reduction in the frequency of urine leakage, number of pads, and frequency of urine voiding. The QOL of patients, especially patients with OAB improved. The mean volume of urine voided showed a statistically significant increase. Only mid-side effects were observed. The PTNS is a successful therapeutic non-invasive method for patients with certain types of lower urinary tract dysfunction.	1	3	30	9	0.2	M	0_10	20	1*12=12	37	PTNS		NRCT OAB	Vanbalken 2001 (46)	10
There was a significant improvement in urinary frequency, urge incontinence frequency, urinary emergency, and in the scores of symptoms severity and QOL of OAB and health-related questionnaire. Some mild side effects of unknown relationship to treatment were reported. PTNS with 1.3 treatments per month is a long-term safe,	1	6	30	NM	NM	NM	0.5-9	20	1*12=12	50	PTNS		NRCT OAB	Peters 2012 (28)	11

<p> durable and valuable therapeutic method to significantly maintain the clinical control of the OAB symptoms. </p>															
<p> Sexual dysfunction is observed in most of the patients with lower urinary tract dysfunction, which may be improved in the recent successful treatment. </p>	1	4	30	9	0.2	P	0_10	20	1*12=12	83	PTNS		NRCT OAB	Van Balken, et al 2006 (62)	12
<p> No significant change was observed in the pain scores, urine voiding frequency, urine volume, and the scores of ICPI, ICSI, and SF-36. However, an improvement was observed in some patients. The treatment had no side effects. Intermittent PTNS has no significant clinical effect on patients with refractory IC during 10 weeks. </p>	1	3	30	9	NM	P	0_10	20	1*10=10	14	PTNS		NRCT PB	Zhao 2004 (70)	13
<p> After stopping treatment for 6 weeks, the frequency and severity of incontinence worsened significantly ($p < 0.05$). After retreatment, the number of incontinence episodes, incontinence severity, as well as the QOL improved significantly ($p < 0.05$). The mean voided volume was significantly worsened and it was significantly improved during the retreatment </p>	NM	3	30	NM	0.2	P	0_10	20	3*4=12	11	PTNS		NRCT OAB	van der Pal 2006 (63)	14

<p>period ($p < 0.05$). Continued treatment is considered necessary in OAB patients who have been successfully treated with PTNS. The PTNS can be made effective again in patients who have already been successfully treated.</p>															
<p>Daily incontinence frequency and daily urge incontinence frequency during 2 years were statistically similar to the recorded cases within 6 weeks and remained less than the baseline level. No side effects other than hypoesthesia were reported. Women who received PTNS for refractory OAB syndrome during 2 years, reported significant symptom relief. PTNS is an excellent safe durable therapeutic method in the second line of treatment.</p>	1	1	30	9	0.2	M	0_10	20	1*6=6	30	PTNS		NRCT OAB	Yoong 2013 (65)	15
<p>No statistically significant improvement was observed in VAS. The scores of ICPI, ICSI, and SF-36 were improved significantly. No significant difference was observed in the diary index and SF-36 scores between the two groups and before and after treatment. Out of 18 patients, the bladder volume had a statistically</p>	NM	3	30	9	NM	P	0_10	20	2*5=10	18	PTNS		NRCT PB	Zhao 2008 (69)	16

<p>significant improvement in 8 patients who evaluated the trial to be effective. All patients completed the 10 therapy sessions without any side effects.</p> <p>Intermittent PTNS may be an alternative therapy for patients with IC symptoms.</p>															
<p>A significant improvement was observed in the maximum bladder capacity and pain symptoms. The intravesical heparin and peripheral neuromodulation combination seems to be an alternative for patients with refractory IC.</p>	NM	5	30	NM	NM	M	0, 10	20	28	10	Intravesical heparin + PTNS		NRCT Non-ulcer IC	Baykal 2005 (66)	17
<p>The mean daily urine voiding and urge incontinence were reduced by 25% and 35%, respectively (p<0.05). Statically significant improvements were observed in the pain and QOL indices. No significant side effects were observed in patients.</p> <p>Percutaneous peripheral afferent nerve stimulation is a safe, minimally invasive and effective therapy for treating refractory OAB and/or pelvic floor dysfunction.</p>	2	1	30	NM	0.2	M	0_10	20	1*12=12	53	PTNS		NRCT OAB	Govier 2001 (53)	18
<p>Subjective success was seen in 51.5% of patients. The SF-36 total score was low. The patients also</p>	1	4	30	9	0.2	P	0_10	20	1*12=12	83	PTNS		NRCT OAB	van Balken 2006 (61)	19

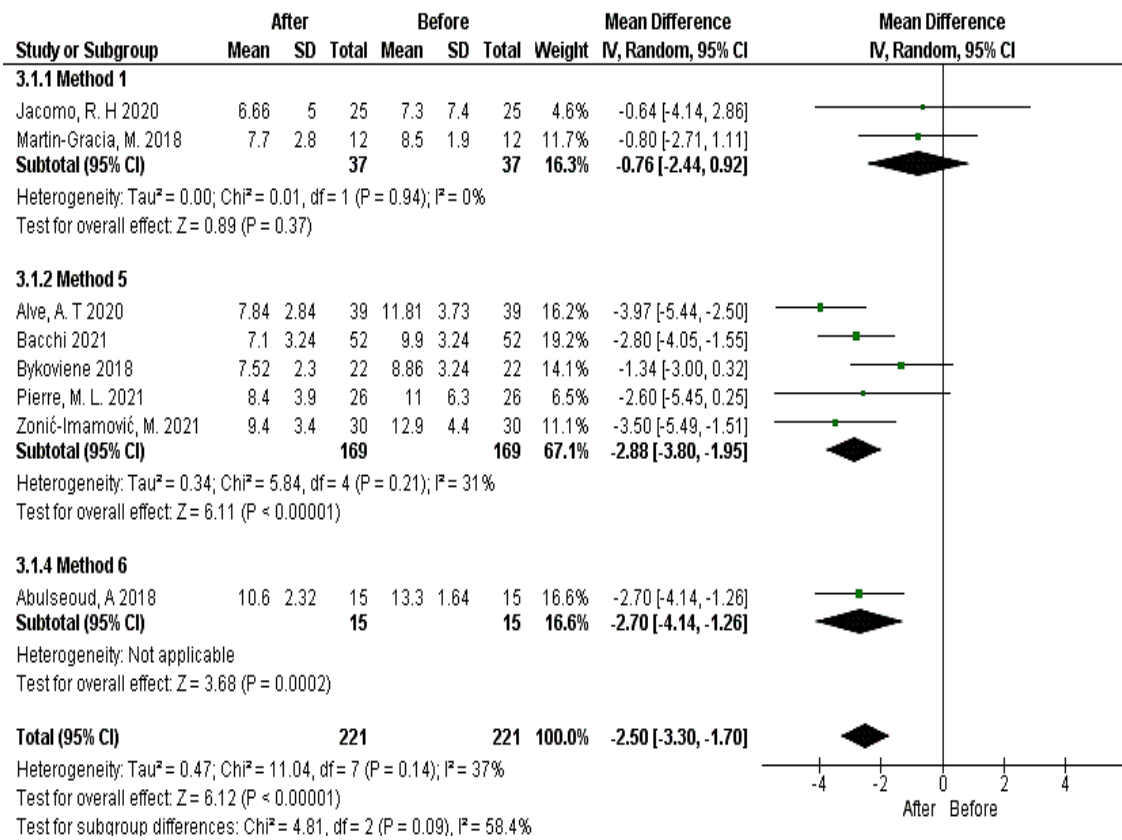
scored worse on the disease-specific QOL questionnaire, though the disease severity was not different. PTNS may be used as a tool for neuromodulation therapy in patients.															
Twelve and all 14 patients with dysfunctional voiding were improved (p not significant). During 1 year of follow-up, the dysfunctional voiding was improved greater in OAB patients (71% vs 41%) and the improvement remained the same at the 2-year evaluation. The voided volume and post-void residual urine became normal in most of the patients with dysfunctional voiding. PTNS is reliable and effective for nonneurogenic refractory lower urinary tract dysfunction in children. The PTNS efficacy seems to be better in dysfunctional voiding cases than in the OAB ones.	1	6	30	9	NM	NM	NM	NM	1*12=12	14	PTNS		NRCT OAB	Capitanucci 2009 (49)	20
The objective and subjective success rate was 56% and 64% in 24-hour leakages, respectively. Urine voiding frequency in terms of volume chart data and QOL scores improved significantly (P < 0.01). Cystometric bladder capacity	1	2	30	9	0.2	M	0_10	20	12	90	PTNS		NRCT OAB	Vandoninck 2003 (64)	21

(p=0.043) and bladder volume (p=0.012) increased significantly. PTNS cannot abolish Detrusor instability but it increases cystometric capacity and delays the onset of Detrusor instability. PTNS can be useful in the cystometry of patients without Detrusor instability or with late Detrusor instability onset.															
The scores of the health-related questionnaire and ICIQ-SF were improved significantly. PTNS can be considered as a good alternative to OAB therapy because it is safe and inexpensive as compared to other therapeutic methods and improves the QOL in women with refractory OAB.	2	NM	30	9	0.2	P	0_10	10	2*6=12	11	PTNS		NRCT OAB	Fischer-Sgrott 2009 (52)	22
At 6, 12, and 24 months of follow-up, 92.4%, 91.69%, and 62.5% of patients improved, respectively. Night-time urination frequency (P ≤ .05) and QOL (P ≤ .01) were significantly worsened. By the end of therapy, the first sensation of bladder filling increased. The mean post-therapy bladder capacity increased by 72.7 mL (P ≤ .001). PTNS is a good option for OAB therapy.	1	4	30	9	0.2	M	0_10	20	14	53	PTNS		Cohort OAB	Marchal 2011 (71)	23
According to the urinary diary,	1	3	30	NM	0.2	P	2.5_9	20	1*12=12	1	PTNS		NRCT OAB	Pytel 2018	24

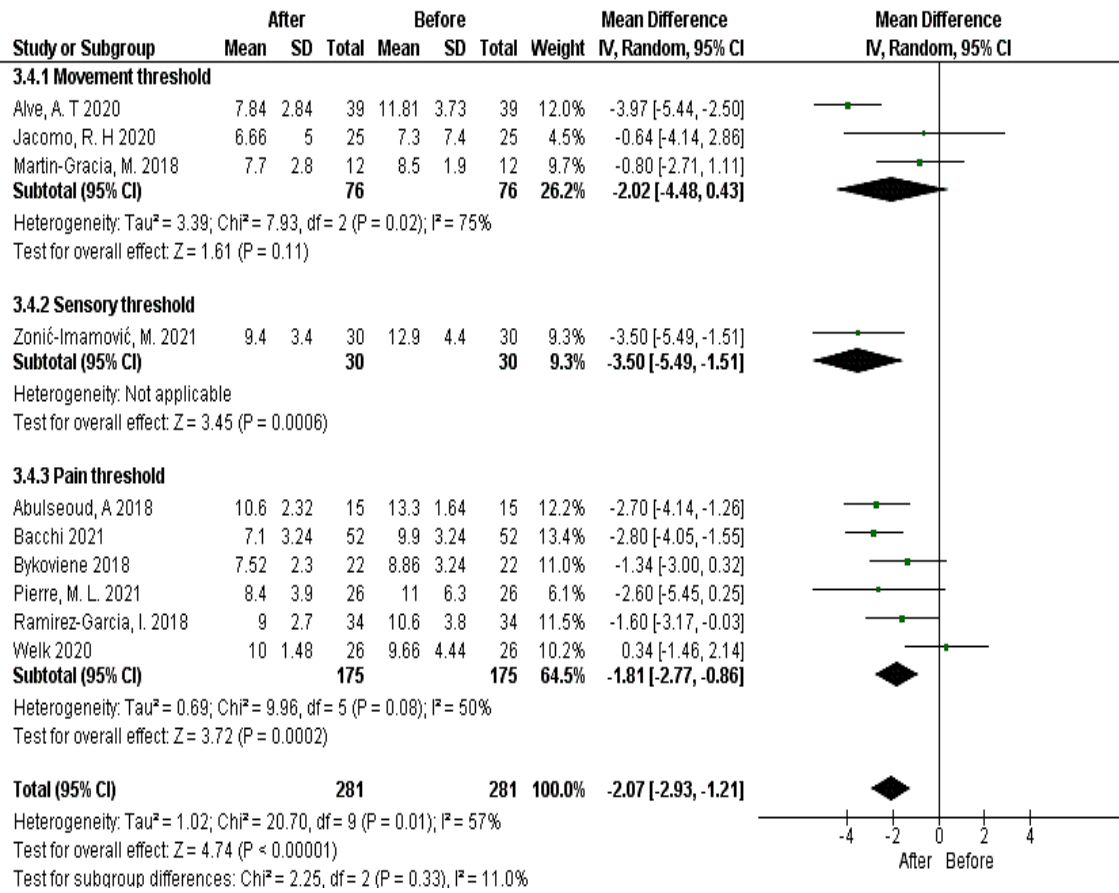
<p>incontinence frequency, frequent urination, and tendency to urinate improved. Urodynamic examination showed no significant change in the target parameters. No side effects were observed. PTNS is an effective, minimally invasive, tolerable and safe therapy for OAB syndrome.</p>															(60)
<p>Daily urine voiding and daily emergency frequency decreased by 3.8 and 4.7 times, respectively, and pain intensity, symptoms, and problem index showed a statistically significant improvement. The changes in the mean volume of urine voided were not statistically significant. The voiding volume improved by 8.4 mL on average. In patients with painful bladder syndrome, the urine voiding diary, and scores of the ICSI, ICPI, and VAS improved after 12 weeks of PTNS treatment. The PTNS treatment is a useful therapeutic option in the first line of the treatment to improve the symptoms of the painful bladder syndrome.</p>	1	6	30	NM	0.2	P	1_5	20	1*12=12	39	PTNS		NRCT PB	Kabay 2021 (67)	25

NRCT: Non-randomized controlled trial, RCT: Randomized controlled trial, OAB: overactive bladder syndrome, PB: painful bladder syndrome, NM: Not mentioned, PTNS: Percutaneous tibial nerve stimulation, TTNS: Transcutaneous tibial nerve stimulation, P: P-value, GRA: Global Response Assessment, ICPI: Interstitial Cystitis Problem Index, IC/BPS Interstitial Cystitis/Painful Bladder, LUTS: Lower

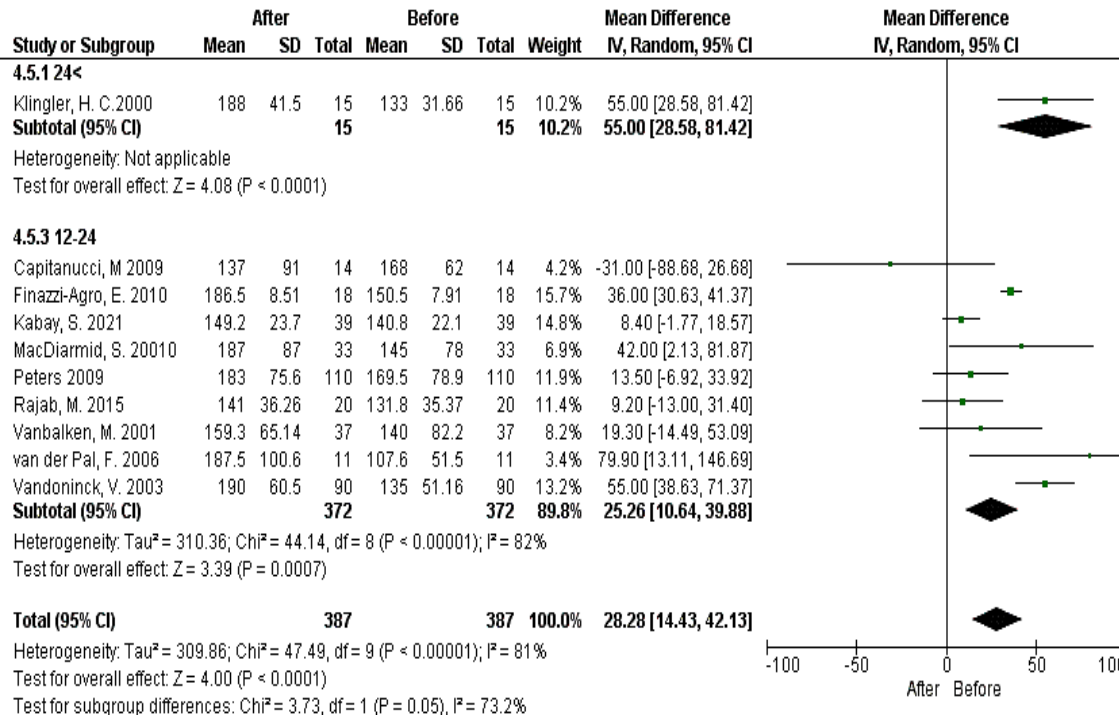
Urinary Tract Syndrome, S3: Sacral spinal nerve 3, ICSI: Interstitial Cystitis Symptom Index, SF_36: Short form with 36 questions, VAS: Visual Analogue Scale



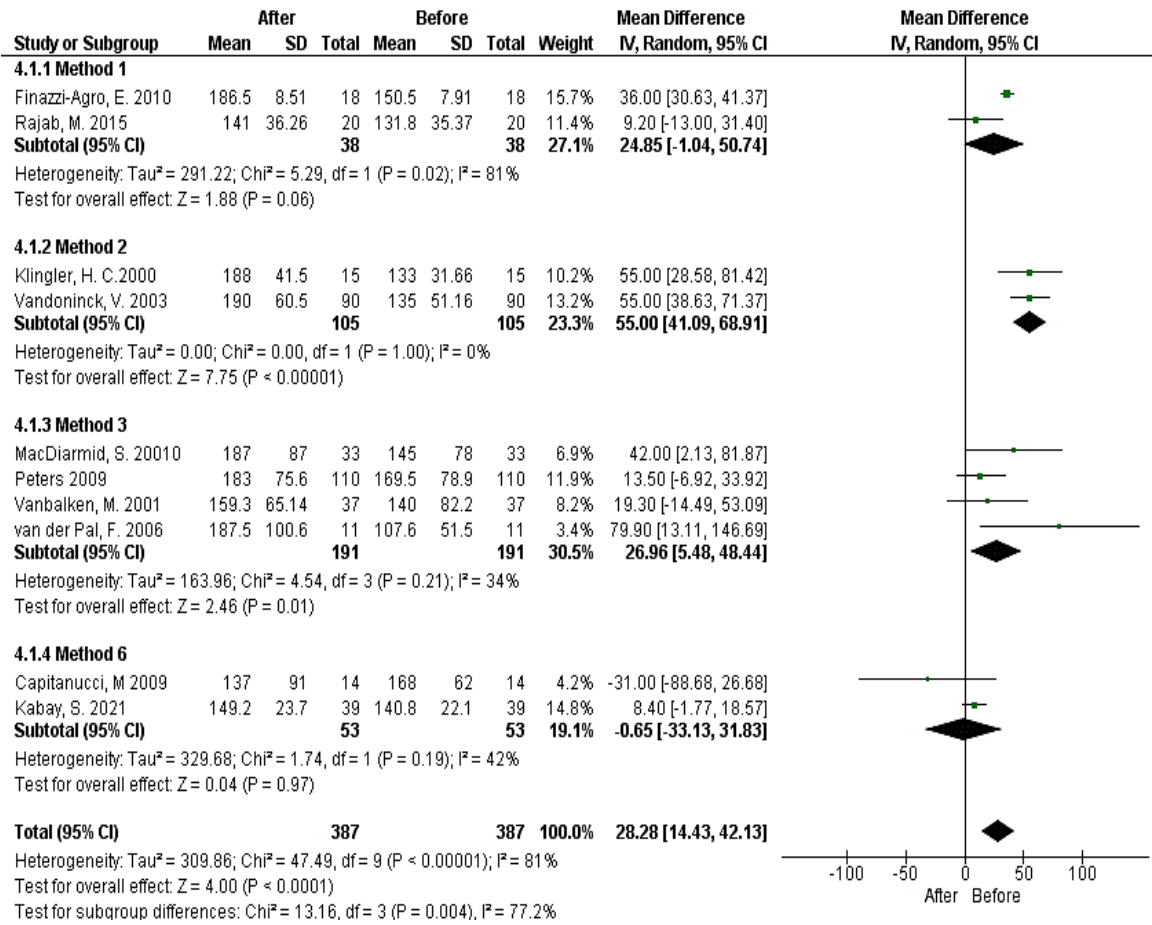
Appendix 3. Voiding frequency after treatment according to the surface method stimulation and electrode placement



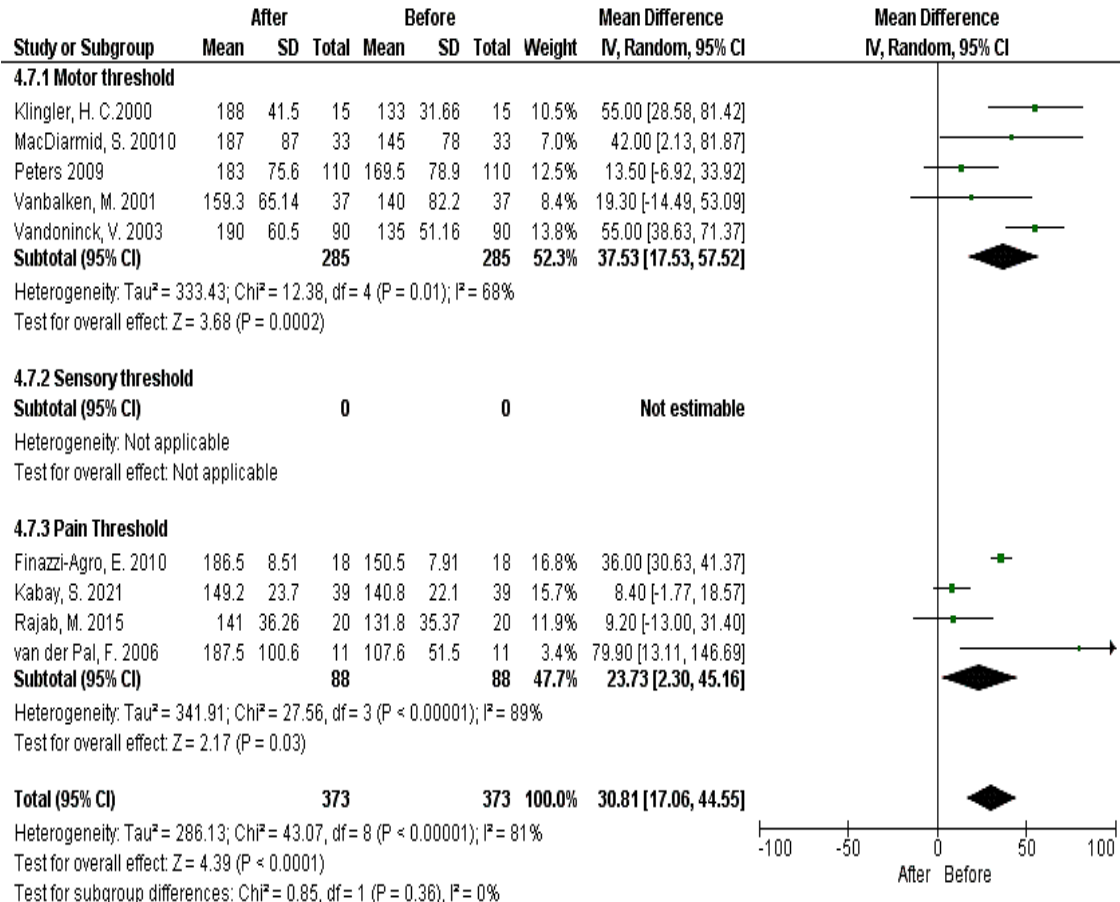
Appendix 4. Voiding frequency after treatment according to the surface method stimulation and intensity of electrical stimulation



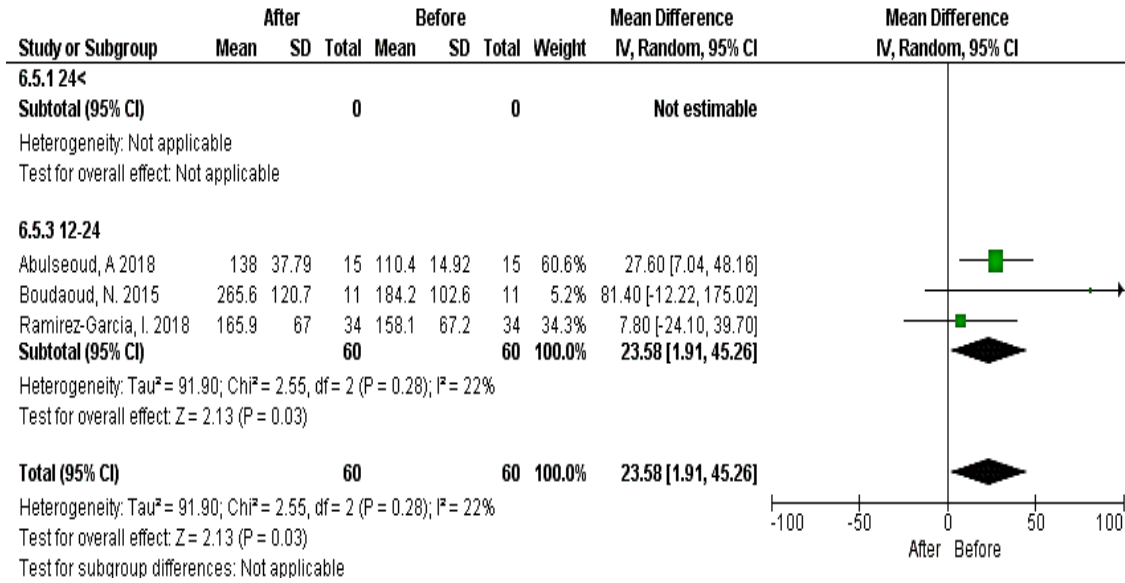
Appendix 5. Voided volume after treatment according to the needle method in all studies and considering subgroups of treatment duration



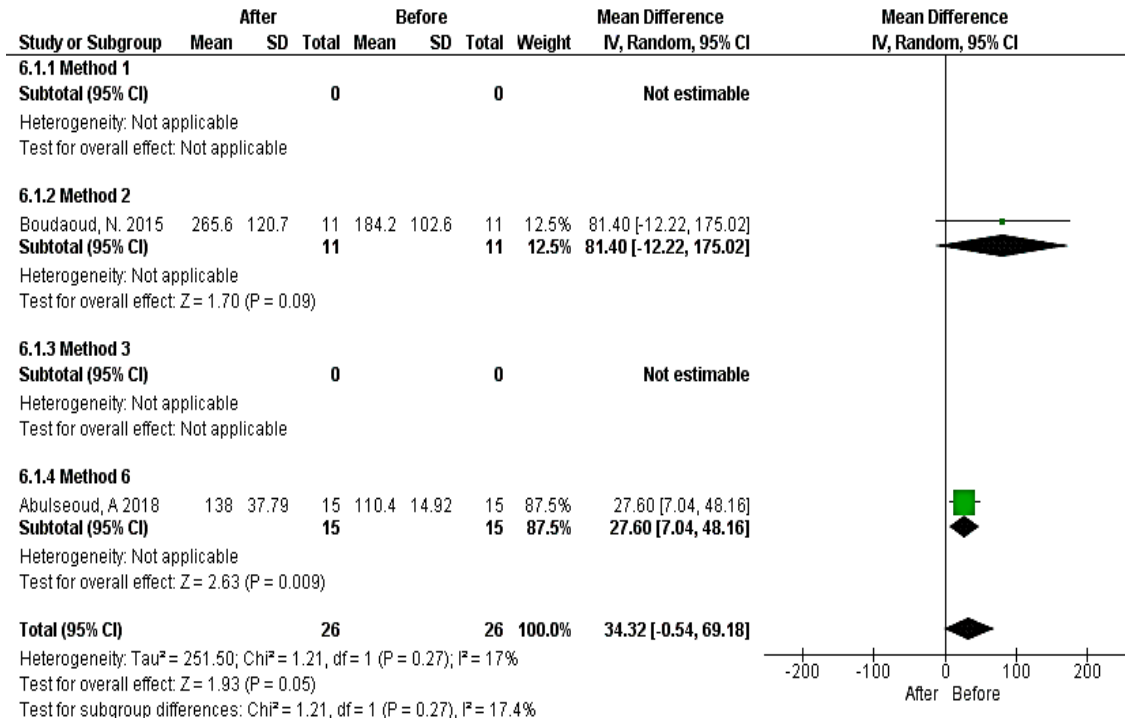
Appendix 6. Voided volume after treatment according to the needle method in all studies and considering needle placement



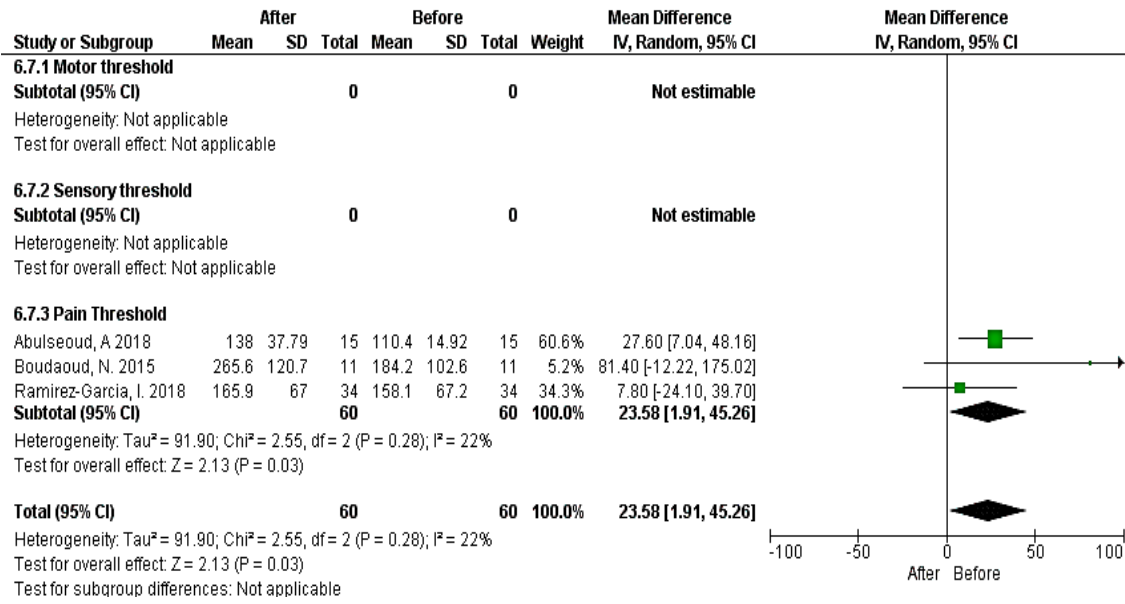
Appendix 7. Voided volume after treatment according to the needle method in all studies and considering electrical stimulation threshold



Appendix 8. Voided volume after treatment according to the surface method and considering electrical stimulation duration



Appendix 9. Voided volume after treatment according to the surface method and considering the needle placement



Appendix 10. Voided volume after treatment according to the surface method and considering the stimulation threshold

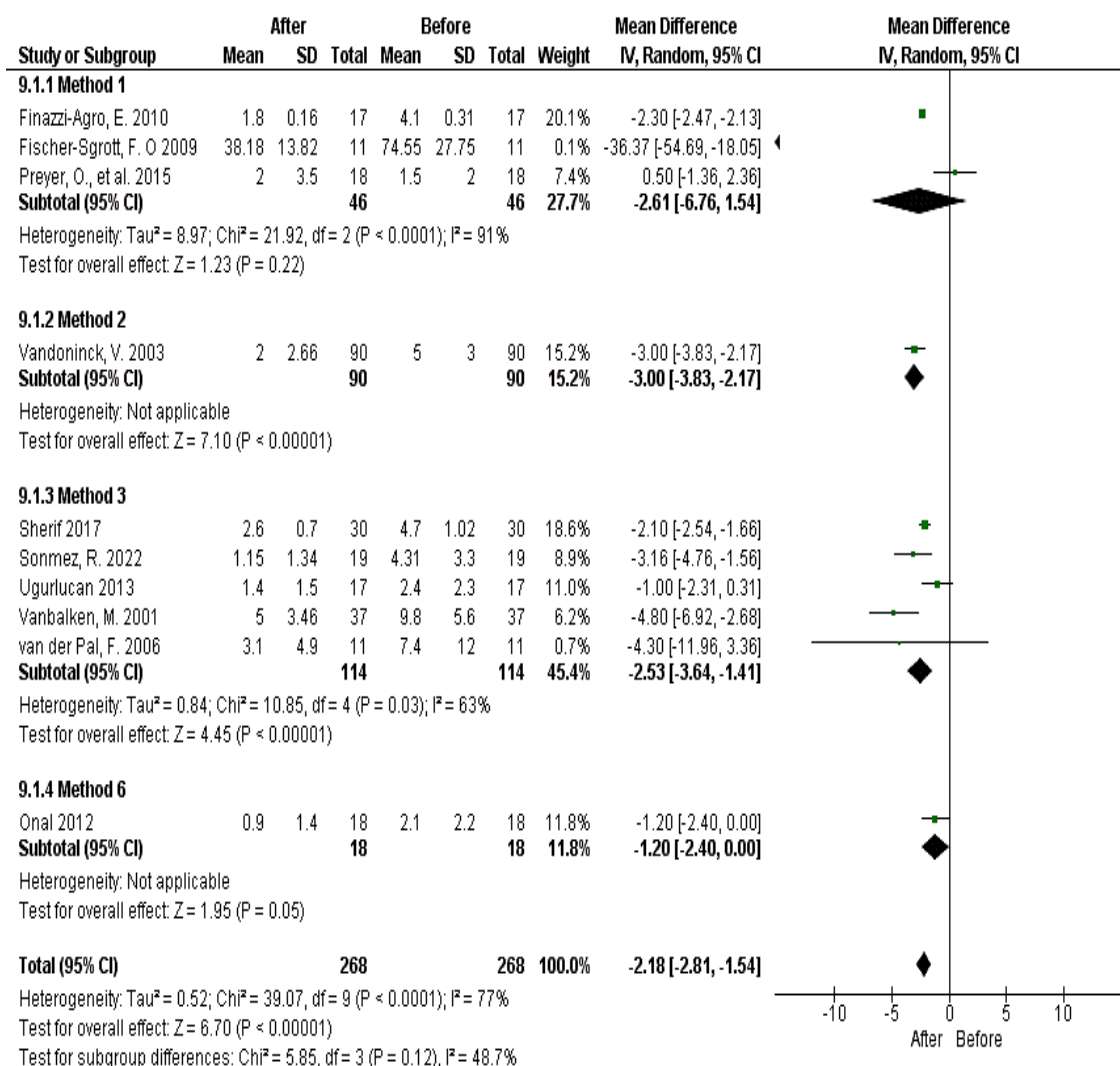
Appendix 11. Urinary incontinence, urgency, maximum cystometric capacity, and urgency urinary incontinence

The other outcomes related to the efficacy of different methods of PTNS results are summarized in supplementary files. According to the results of the electrode method, nine studies in subgroups of methods 3, 2, 1, and 6 were included in the meta-analysis. After treatment, a reduction of incontinence episodes was demonstrated (Point estimate: -2.18; 95% CI: -1.54 to -2.81, $P < 0.00001$, $Z = 6.70$). The intensity of the stimulation at the level of stimulation of the motor threshold and pain causes improvement and a significant decrease in the average frequency of urine leakage. In the surface method of stimulation electrode method 5 significantly reduced the UI episodes. However, in method 1 there was no significant reduction. The mean difference of urinary incontinence after treatment according to the surface method and considering the stimulation threshold decreased by 0.83 times (95% CI: -1.41 to -0.26) and this rate was statistically significant, $P = 0.005$). However, in subgroup analysis, this rate was only significant in the pain threshold (Supplementary files 2 a-d).

The results of different method of stimulation on urgency episodes are illustrated in figures Supplementary files 2 e-g.

Although the mean difference of the maximum cystometric capacity after treatment with this stimulation was increased (58.24 ml, $P < 0.003$; $I^2 = 78.0\%$), only, the first and fourth methods of electrodeposition improved the average maximum cystometric capacity (supplementary file 2h, and i).

Considering that the frequency of urgency urinary incontinence (UUI), in 14 studies, a reduction in the frequency of UUI was observed (Point estimate: -1.23 times (95% CI: -0.57 to -1.88, $P = 0.0002$). Methods 1, 3, and 6 of electrode placement significantly reduced the mean UUI (supplementary file 2g). In the surface method, electrode placement in methods of 1,2, and 5 significantly reduced the mean of UUI (supplementary file 2h). Stimulation at the threshold of movement and pain caused a significant decrease in the mean of UUI episodes (supplementary file 2j-l).



Appendix 11a. Incontinence episodes after treatment in different methods of stimulation

Method 1: The first electrode is placed 3-5 cm above the medial malleolus, and the second electrode is placed around the medial malleolus.

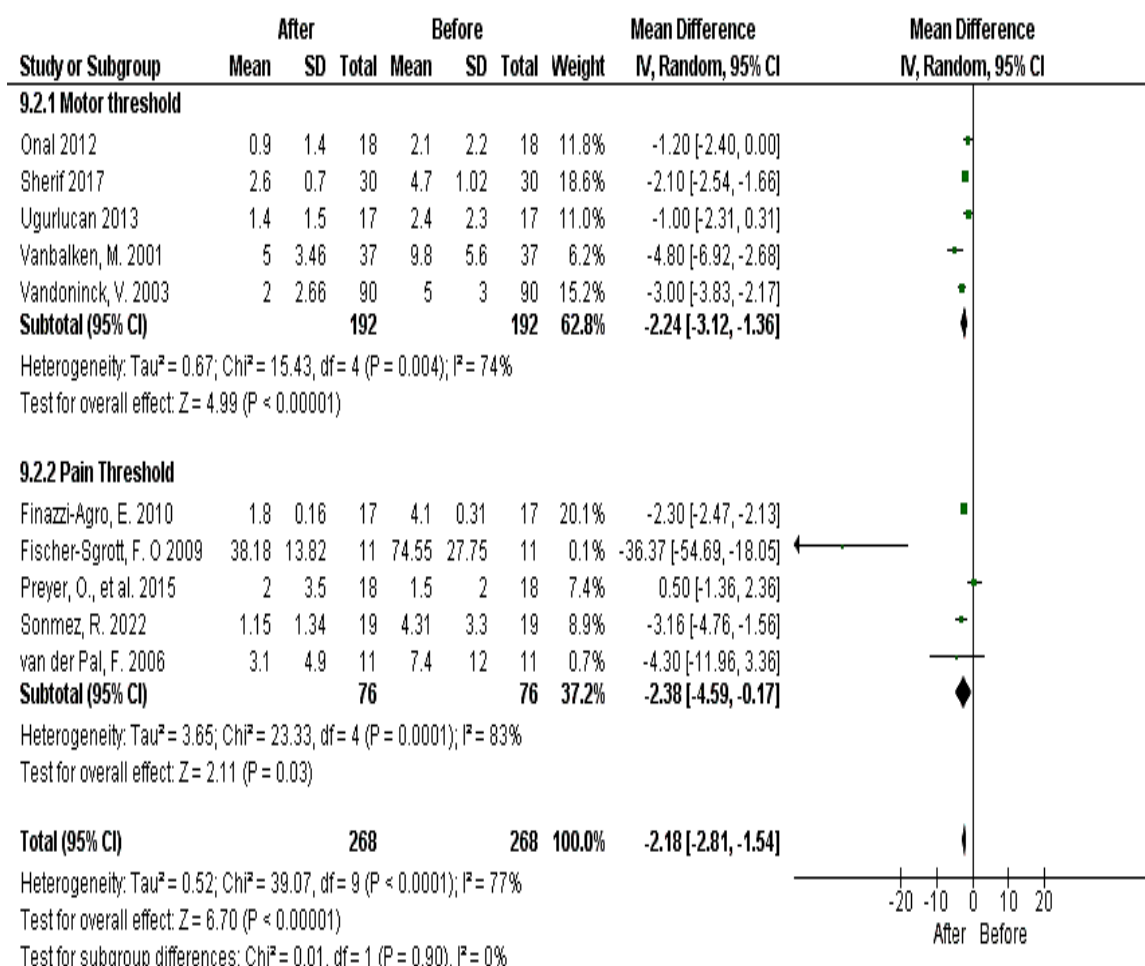
Method 2: The first electrode is placed less than 3 cm above the medial malleolus, and the second electrode is placed around the medial malleolus.

Method 3: The first electrode is placed 3-5 cm above the medial malleolus, and the second electrode is placed on the arch of the foot.

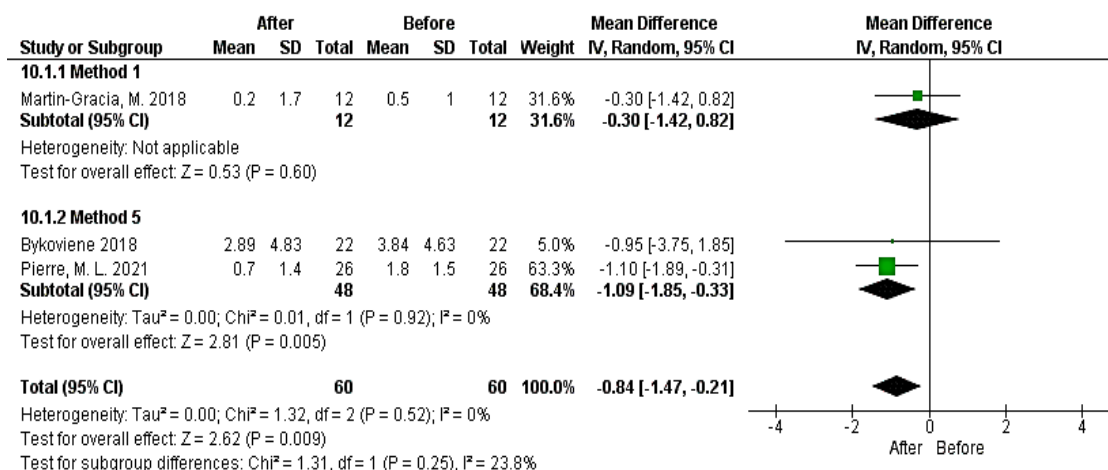
Method 4: The first electrode is placed less than 3 cm above the medial malleolus, and the second electrode is placed on the arch of the foot.

Method 5: The first electrode is placed more than 5 cm above the medial malleolus, and the second electrode is placed around the medial malleolus.

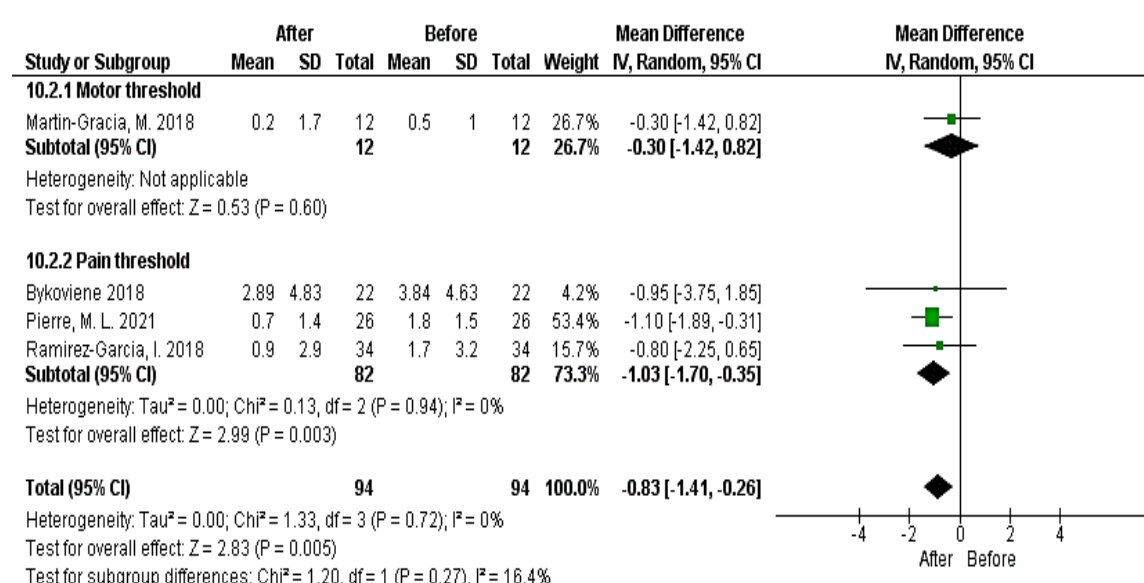
Method 6: Both electrodes are placed on the tibial nerve on the foot at points other than the defined methods.



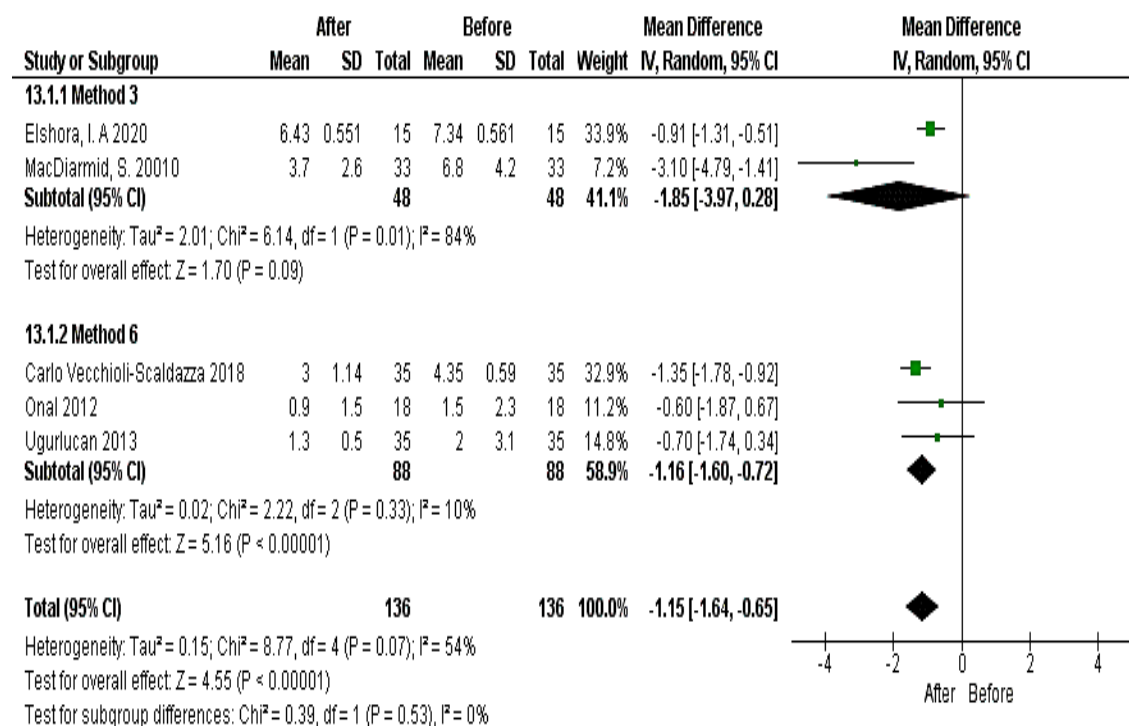
Appendix 11b. Incontinence episodes after treatment in different stimulation threshold



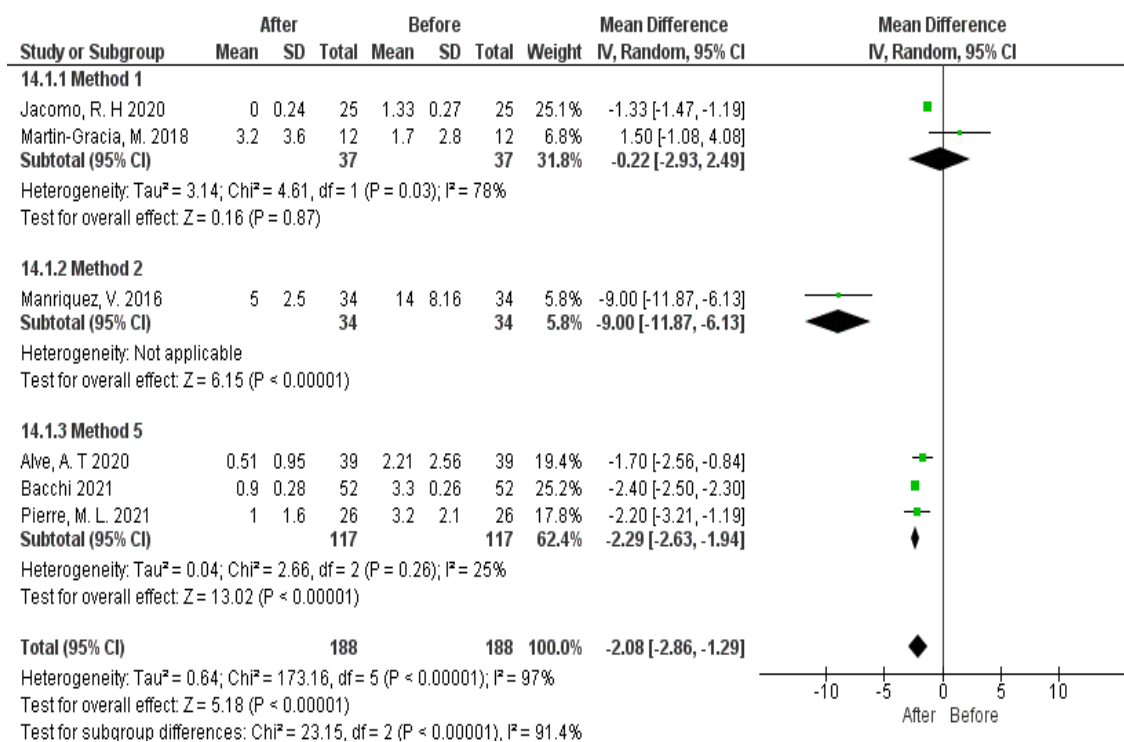
Appendix 11c. Incontinence episodes after treatment according to the surface method and considering the needle placement



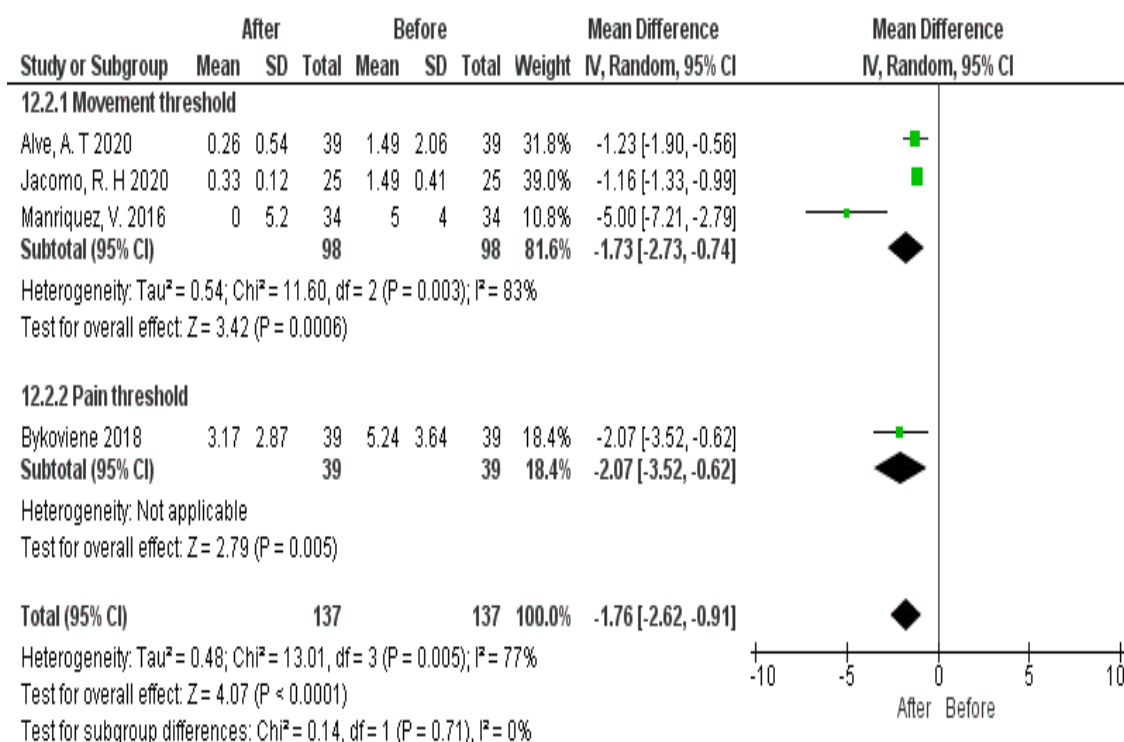
Appendix 11d. Incontinence episodes after treatment according to the surface method and considering the stimulation threshold.



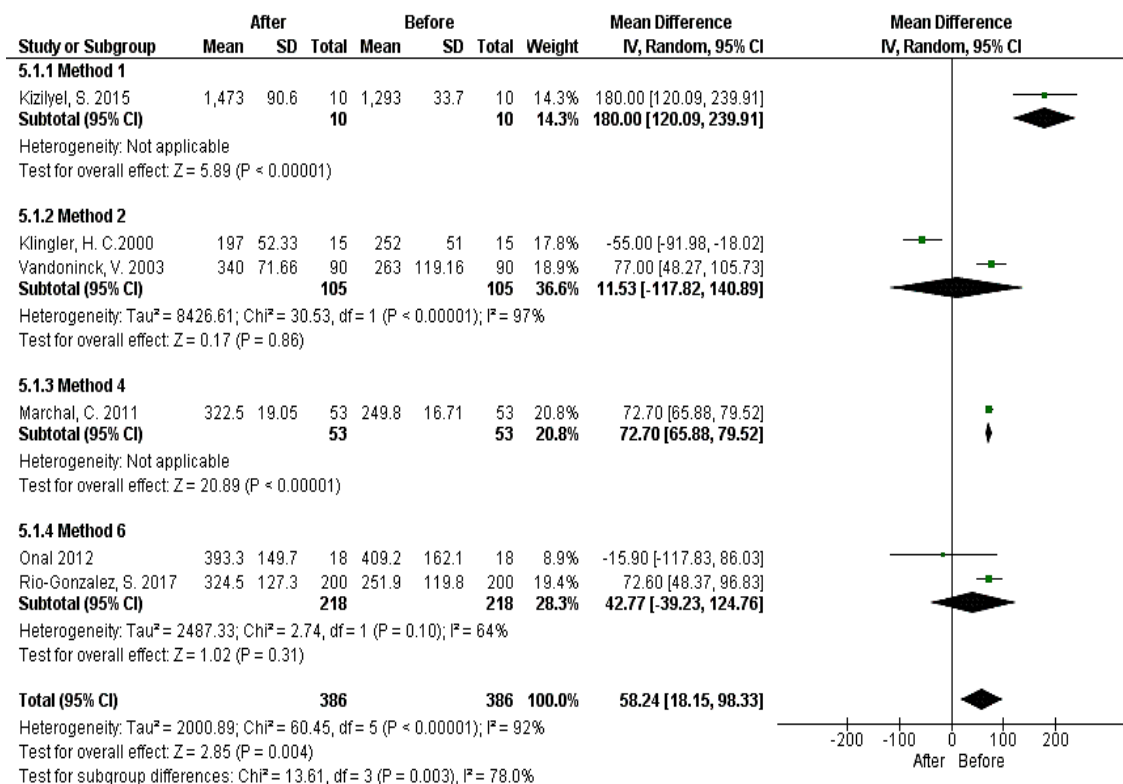
Appendix 11e. Urgency episodes after treatment in different methods of stimulation



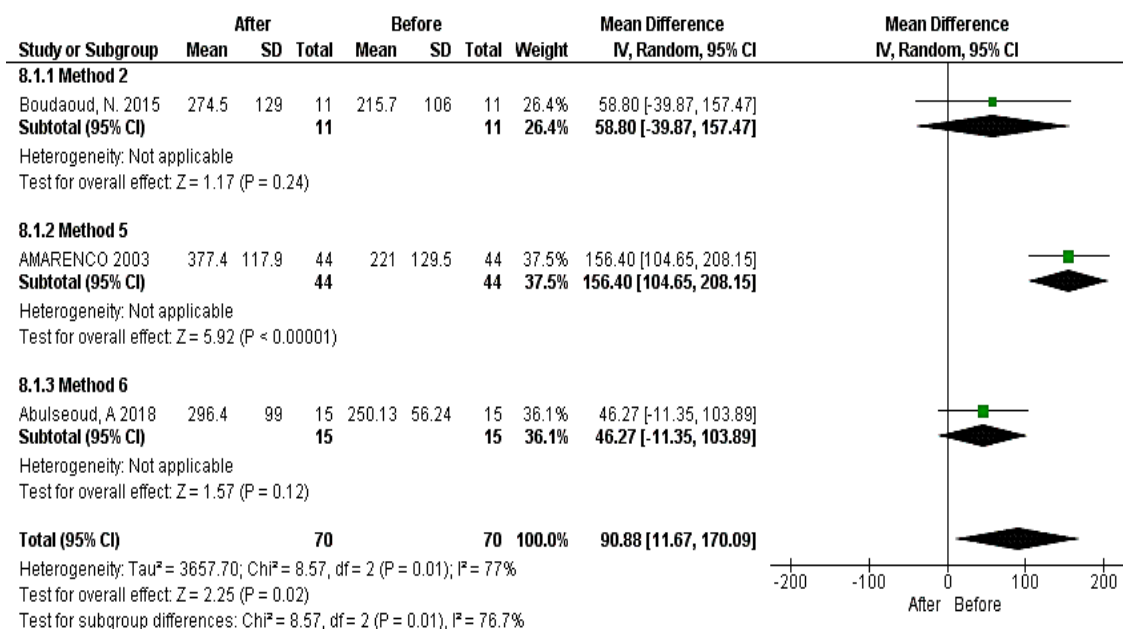
Appendix 11f. Urgency episodes after treatment according to the surface method and considering the stimulation methods



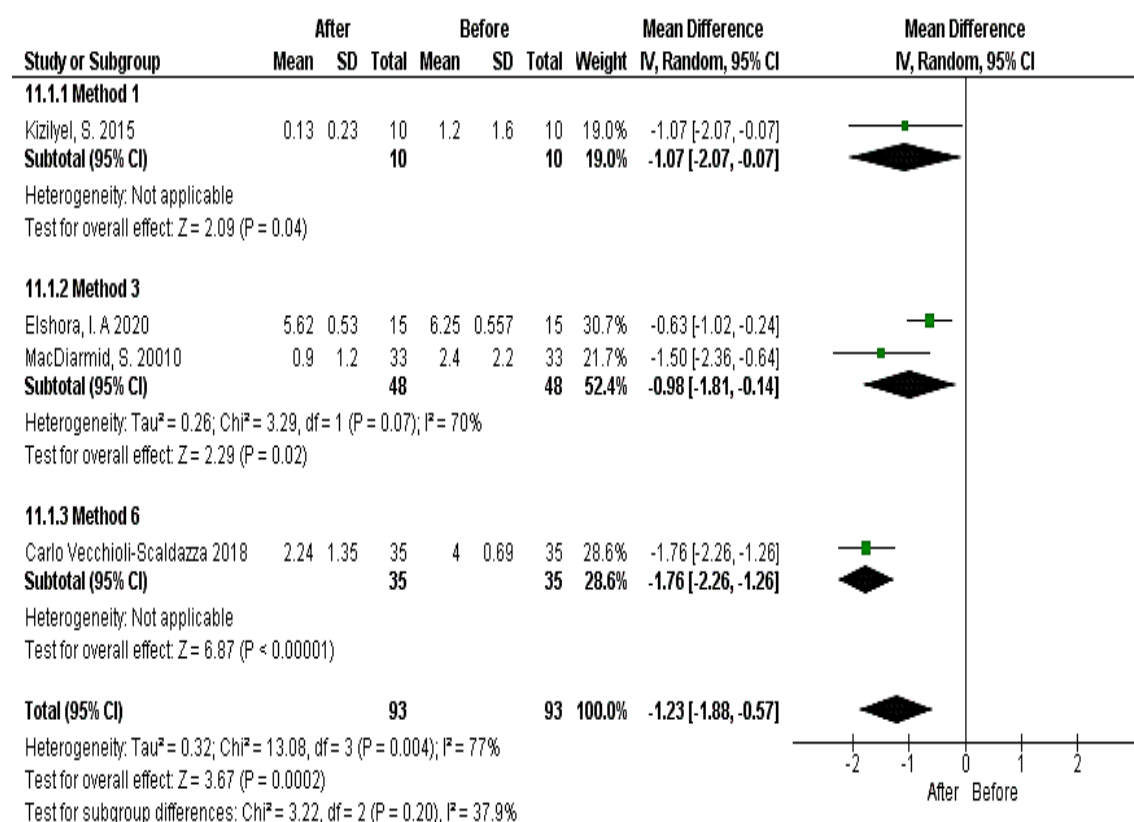
Appendix 11g. Urgency episodes after treatment according to the surface method and considering the stimulation threshold



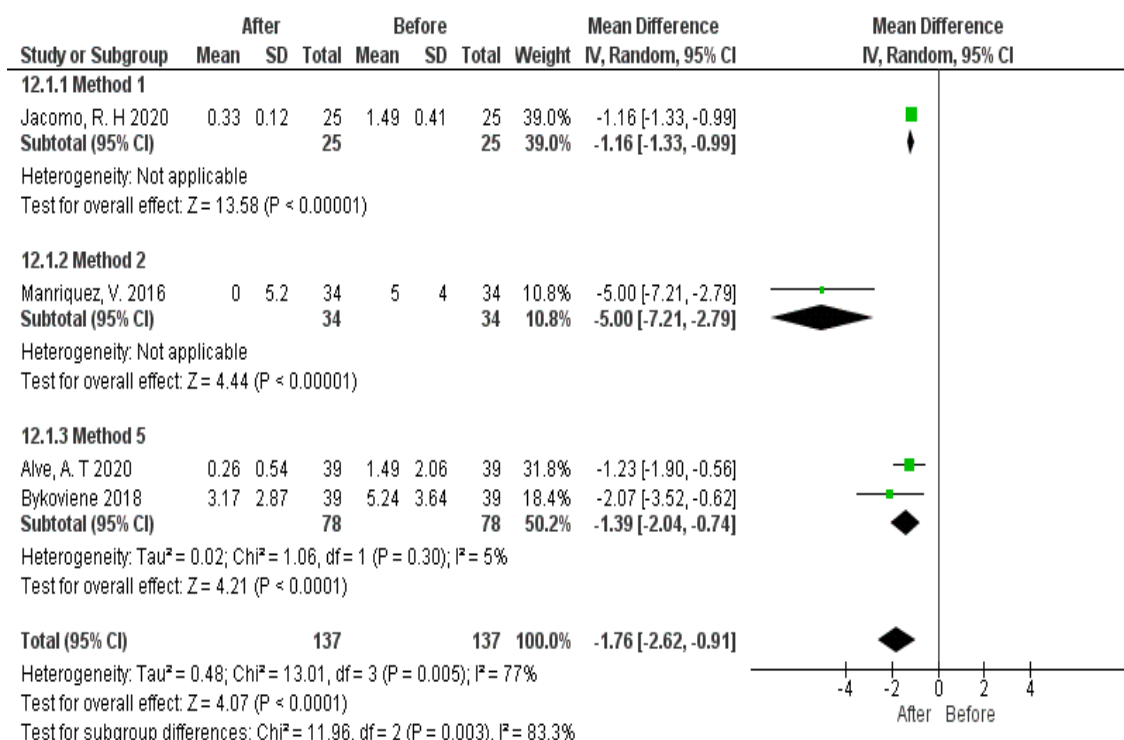
Appendix 11h. maximum cystometric capacity after treatment according to the stimulation methods



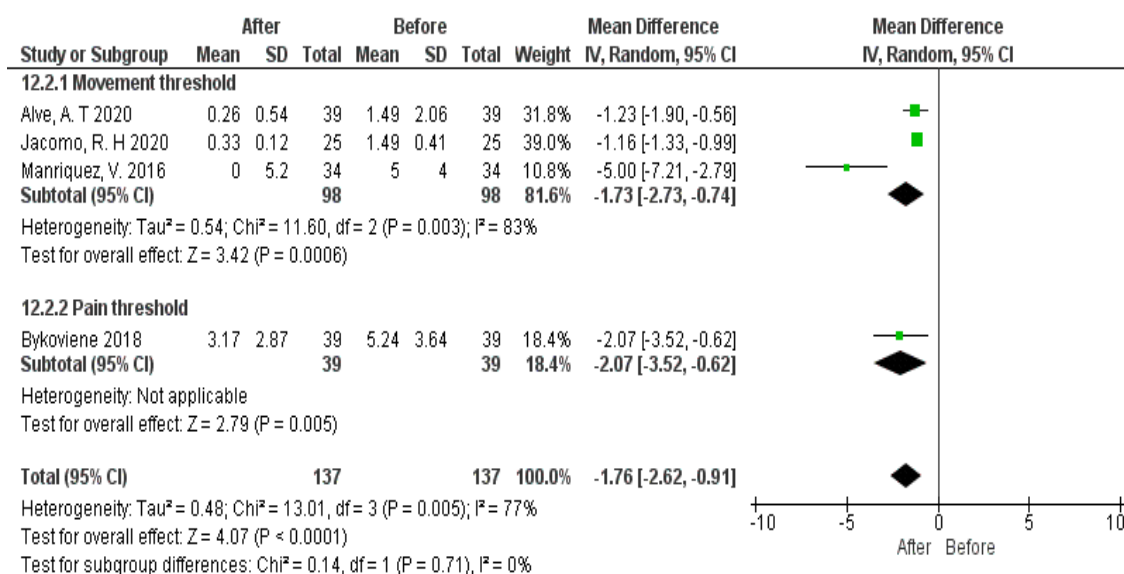
Appendix 11i. maximum cystometric capacity after treatment according to the surface method and considering the stimulation method



Appendix 11j. UUI episodes after treatment according to the stimulation methods



Appendix 11k. UUI episodes after treatment according to the surface method and considering the stimulation method



Appendix 11l. UUI episodes after treatment according to the surface method and considering the stimulation threshold

Appendix 12. Critical appraisal results

JBI CRITICAL APPRAISAL CHECKLIST FOR RANDOMIZED CONTROLLED

No	Author_year_Ref	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Grade	Quality	Overall appraisal
1.	Abulseoud_2018(10)	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	12	*	Include
2	Ahmed_2020(11)	Y	U	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	10	*	Include
3	OkanALKI_2021(12)	Y	U	Y	U	U	U	Y	Y	Y	Y	Y	Y	Y	9	**	Include
4	Alve_2020(13)	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	11	*	Include
5	Bacchi_2021(14)	Y	Y	Y	U	U	Y	Y	Y	Y	Y	Y	Y	Y	11	*	Include
6	Boudaoud_2015(15)	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	12	*	Include
7	Bykoviene_2018(16)	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	11	*	Include
8	Ebid_2009(17)	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	10	**	Include
9	Elshora_2020(18)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	N	8	**	Include
10	Finazzi-Agro_2010(19)	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	11	*	Include
11	Girtner_2021(20)	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	11	*	Include
12	GungorUgurlucan_2013(21)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
13	Jacomo_2020(22)	Y	Y	Y	N	N	Y	Y	N	Y	Y	Y	Y	Y	10	*	Include
14	Karademir_2005(23)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	N	8	**	Include
15	Kizilyel_2015(24)	U	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	8	**	Include
16	Mallmann_2020(25)	Y	U	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
17	Manriquez_2016(26)	Y	U	Y	N	N	N	Y	Y	N	Y	Y	Y	Y	8	**	Include
18	Martin-Gracia_2018(27)	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	11	*	Include
19	Peters_2012(28)	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	11	*	Include
20	Peters_2009(29)	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	12	*	Include
21	Preyer_2015(30)	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	10	**	Include
22	Ramirez-Garcia_2019(31)	Y	U	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
23	Ramirez-Garcia_2021(32)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
24	Sancaktar_2010(33)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
25	Sherif_2017(34)	Y	U	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
26	Souto_2014(35)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
27	Svihra_2002(36)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
28	Vecchioli-Scaldazza_2018(37)	Y	N	Y	U	U	Y	Y	Y	Y	Y	Y	Y	Y	10	**	Include
29	Zhang_2021(38)	Y	U	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	11	*	Include
30	Ayala-Quispe_2020(39)	Y	U	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
31	Lashin_2021(40)	Y	U	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	10	**	Include
32	Pierre_2021(41)	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	11	*	Include

33	Sonmez_2022(42)	Y	U	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	10	**	Include
34	Welk_2020(43)	U	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	10	**	Include
35	Zonić-Imamović_2021(44)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9	**	Include
36	Geirsson_1993(45)	Y	Y	Y	U	U	U	Y	N	N	Y	Y	N	N	6	***	Include

Y = Yes, N = No, U = Unclear

*High: eleven to thirteen positive criteria

**Moderate: eight to ten positive criteria

***Low: <seven positive criteria

JBI CRITICAL APPRAISAL CHECKLIST FOR QUASI-EXPERIMENTAL STUDIES													
No	Author_year_Ref	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Grade	Quality	Overall appraisal
37	Vanbalken, M_2001(46)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
38	AMARENCO_2003(47)	Y	N	Y	N	Y	U	Y	Y	Y	6	**	Include
39	Barroso_2013(48)	Y	Y	Y	U	Y	Y	Y	Y	Y	8	*	Include
40	Capitanucci_2009(49)	Y	N	Y	N	Y	Y	Y	Y	N	6	**	Include
41	De Gennaro_2004(50)	N	N	Y	N	Y	Y	Y	Y	Y	6	**	Include
42	Rio-Gonzalez_2017(51)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
43	Fischer-Sgrott_2009(52)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
44	Govier_2001(53)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
45	Hegazy_2014(54)	Y	Y	Y	Y	U	Y	Y	Y	Y	8	*	Include
46	Klingler_2000(55)	Y	Y	Y	Y	N	Y	Y	Y	Y	8	*	Include
47	MacDiarmid_2010(56)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
48	Macías-Vera_2016(57)	Y	N	Y	Y	Y	Y	Y	Y	Y	8	*	Include
49	Mathieu_2017(58)	Y	N	N	Y	Y	Y	Y	Y	Y	7	**	Include
50	Onal_2012(59)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
51	Pytel_2018(60)	N	N	Y	N	Y	N	Y	Y	Y	5	**	Include
52	van Balken_2006(61)	Y	N	Y	N	Y	Y	Y	Y	Y	7	**	Include
53	van Balken, et al_2006(62)	Y	N	Y	N	Y	Y	Y	Y	Y	7	**	Include
54	van der Pal_2006(63)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
55	Vandoninck_2003(64)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
56	Yoong_2013(65)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
57	Baykal, K_2005(66)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
58	Kabay, S_2021(67)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include

59	Ragab, M_2015(68)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
60	Van balken, M.R_2003(46)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
61	Zhao, J_2008(69)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include
62	Zhao, J_2004(70)	Y	Y	Y	N	Y	Y	Y	Y	Y	8	*	Include

Y = Yes, N = No, U = Unclear

*High: eight to nine positive criteria

**Moderate: five to seven positive criteria

***Low: <five positive criteria

JBI CRITICAL APPRAISAL CHECKLIST FOR COHORT STUDIES IN OVERACTIVE BLADDER SYNDROME															
No	Author_year_Ref	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Grade	Quality	Overall appraisal
63	Marchal_2011(71)	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	9	*	Include

Y = Yes, N = No, U = Unclear

*High: nine to eleven positive criteria

**Moderate: six to eight positive criteria

***Low: < six positive criter