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Acupuncture for treating overactive bladder in adults (Review)

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[Intervention Review]

Acupuncture for treating overactive bladder in adults

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A B S T R A C T

Background

Overactive bladder is a common, long-term symptom complex, which includes frequency of micturition, urgency with or without associated incontinence and nocturia. Around 11% of the population have symptoms, with this figure increasing with age. Symptoms can be linked to social anxiety and adaptive behavioural change. The cost of treating overactive bladder is considerable, with current treatments varying in effectiveness and being associated with side effects. Acupuncture has been suggested as an alternative treatment.

Objectives

To assess the effects of acupuncture for treating overactive bladder in adults, and to summarise the principal findings of relevant economic evaluations.

Search methods

We searched the Cochrane Incontinence Specialised Register, which contains trials identified from the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE (including In-Process, Epub Ahead of Print, Daily), ClinicalTrials.gov and WHO ICTRP (searched 14 May 2022). We also searched the Allied and Complementary Medicine database (AMED) and bibliographic databases where knowledge of the Chinese language was necessary: China National Knowledge Infrastructure (CNKI); Chinese Science and Technology Periodical Database (VIP) and WANFANG (China Online Journals), as well as the reference lists of relevant articles.

Selection criteria

We included randomised controlled trials (RCTs), quasi-RCTs and cross-over RCTs assessing the effects of acupuncture for treating overactive bladder in adults.

Data collection and analysis

Four review authors formed pairs to assess study eligibility and extract data. Both pairs used Covidence software to perform screening and data extraction. We assessed risk of bias using Cochrane's risk of bias tool and assessed heterogeneity using the Chi^2 testand I^2 statistic generated within the meta-analyses. We used a fixed-effect model within the meta-analyses unless there was a moderate or high level of heterogeneity, where we employed a random-effects model. We used the GRADE approach to assess the certainty of evidence.

Main results

We included 15 studies involving 1395 participants in this review (14 RCTs and one quasi-RCT). All included studies raised some concerns regarding risk of bias. Blinding of participants to treatment group was only achieved in 20% of studies, we considered blinding of outcome assessors and allocation concealment to be low risk in only 25% of the studies, and random sequence generation to be either unclear or high risk in more than 50% of the studies.

Acupuncture versus no treatment

One study compared acupuncture to no treatment. The evidence is very uncertain regarding the effect of acupuncture compared to no treatment in curing or improving overactive bladder symptoms and on the number of minor adverse events (both very low-certainty evidence). The study report explicitly stated that no major adverse events occurred. The study did not report on the presence or absence of urinary urgency, episodes of urinary incontinence, daytime urinary frequency or episodes of nocturia.

Acupuncture versus sham acupuncture

Five studies compared acupuncture with sham acupuncture. The evidence is very uncertain about the effect of acupuncture on curing or improving overactive bladder symptoms compared to sham acupuncture (standardised mean difference (SMD) -0.36, 95% confidence interval (CI) -1.03 to 0.31; 3 studies; 151 participants; I^2 = 65%; very low-certainty evidence). All five studies explicitly stated that there were no major adverse events observed during the study. Moderate-certainty evidence suggests that acupuncture probably makes no difference to the incidence of minor adverse events compared to sham acupuncture (risk ratio (RR) 1.28, 95% CI 0.30 to 5.36; 4 studies; 222 participants; I^2 = 0%). Only one small study reported data for the presence or absence of urgency and for episodes of nocturia. The evidence is of very low certainty for both of these outcomes and in both cases the lower confidence interval is implausible. Moderate-certainty evidence suggests there is probably little or no difference in episodes of urinary incontinence between acupuncture and sham acupuncture (mean difference (MD) 0.55, 95% CI -1.51 to 2.60; 2 studies; 121 participants; I^2 = 57%). Two studies recorded data regarding daytime urinary frequency but we could not combine them in a meta-analysis due to differences in methodologies (very low-certainty evidence).

Acupuncture versus medication

Eleven studies compared acupuncture with medication. Low-certainty evidence suggests that acupuncture may slightly increase how many people's overactive bladder symptoms are cured or improved compared to medication (RR 1.25, 95% CI 1.10 to 1.43; 5 studies; 258 participants; I^2 = 19%). Low-certainty evidence suggests that acupuncture may reduce the incidence of minor adverse events when compared to medication (RR 0.34, 95% CI 0.26 to 0.45; 8 studies; 1004 participants; I^2 = 51%). The evidence is uncertain regarding the effect of acupuncture on the presence or absence of urinary urgency (MD -0.40, 95% CI -0.56 to -0.24; 2 studies; 80 participants; I^2 = 0%; very low-certainty evidence) and episodes of urinary incontinence (MD -0.33, 95% CI -2.75 to 2.09; 1 study; 20 participants; very low-certainty evidence) compared to medication. Low-certainty evidence suggests there may be little to no effect of acupuncture compared to medication in terms of daytime urinary frequency (MD 0.73, 95% CI -0.39 to 1.85; 4 studies; 360 participants; I^2 = 28%). Acupuncture may slightly reduce the number of nocturia episodes compared to medication (MD -0.50, 95% CI -0.65 to -0.36; 2 studies; 80 participants; I^2 = 0%, low-certainty evidence).

There were no incidences of major adverse events in any of the included studies. However, major adverse events are rare in acupuncture trials and the numbers included in this review may be insufficient to detect these events.

Authors' conclusions

The evidence is very uncertain about the effect acupuncture has on cure or improvement of overactive bladder symptoms compared to no treatment. It is uncertain if there is any difference between acupuncture and sham acupuncture in cure or improvement of overactive bladder symptoms. This review provides low-certainty evidence that acupuncture may result in a slight increase in cure or improvement of overactive bladder symptoms when compared with medication and may reduce the incidence of minor adverse events.

These conclusions must remain tentative until the completion of larger, higher-quality studies that use relevant, comparable outcomes. Timing and frequency of treatment, point selection, application and long-term follow-up are other areas relevant for research.

P L A I N   L A N G U A G E   S U M M A R Y

Acupuncture for treating overactive bladder in adults

Review question

Is acupuncture a safe and effective treatment for treating overactive bladder in adults?

Background

Overactive bladder is the term used to describe a group of urinary symptoms, including an urgent need to pass urine, frequent voiding (emptying), urinary incontinence and waking one or more times at night to pass urine (nocturia). Sufferers may have one or more of these

symptoms. Overactive bladder is a common complaint and can affect both men and women of any age, though it is more common in older people. Treatment can include bladder education, pelvic floor exercises, medication, botox injections into the bladder wall, sacral neuromodulation and surgery.

Acupuncture refers to the practice of inserting fine needles into defined points on the body in order to achieve an improvement in health. It is used in a wide range of conditions and has been suggested as a possible treatment for overactive bladder symptoms.

How up-to-date is this review?

This review includes all studies that met our eligibility criteria, published up to 14 May 2022. We are aware of six ongoing studies and two studies that we cannot obtain in full, which were not included in our review.

Study characteristics

We included 15 studies involving a total of 1395 participants with overactive bladder. The majority of the studies had small numbers of participants and we had some reservations about the study designs, processes or both in the majority of the studies.

Study funding sources

Of the 15 included studies, four were supported by Chinese Government-funded research grants and two were funded by Higher Education institutions. The open access publishing fee for one study was paid by the Norwegian Acupuncture Association. Eight studies did not report any source of funding.

Key results

The different methods used by the studies made the comparison of results difficult.

Compared to no treatment, the effect of acupuncture on curing or improving overactive bladder symptoms and the amount of minor side effects is very uncertain. No major adverse events took place. The were no reports on the effect of acupuncture compared to no treatment with regard to reducing urinary urgency, daytime urinary frequency, episodes of urinary incontinence or episodes of nocturia.

Compared to sham (fake) acupuncture, the effect of acupuncture on curing or improving overactive bladder symptoms is uncertain. Acupuncture probably makes little or no difference to the number of minor adverse events compared to sham acupuncture. No major adverse events took place in any of the studies. The evidence is very uncertain regarding the effect of acupuncture on the presence of absence of urinary urgency, daytime urinary frequency or episodes of nocturia. There is probably no difference between acupuncture and sham acupuncture in terms of episodes of urinary incontinence.

Acupuncture may result in a slight improvement in overactive bladder symptoms when compared with medication and may result in a reduced number of minor adverse events. No major adverse events took place. The effect of acupuncture compared to medication is very uncertain with regard to urinary urgency and episodes of incontinence. Acupuncture may have the same effect as medication on urinary frequency and may slightly reduce episodes of nocturia.

Certainty of the evidence

The majority of the evidence in this review is of very low or low certainty because the included studies had flaws in their design and/or execution. Many had small numbers of participants and were conducted over a short period of time. Given these issues, it is difficult to draw conclusions regarding how effective acupuncture is for treating overactive bladder. Further well-designed, large-scale studies are required to answer this question.

SUMMARY OF FINDINGS

Summary of findings 1. Acupuncture compared to no treatment for overactive bladder in adults

Acupuncture compared to no treatment for overactive bladder in adults

Patient or population: overactive bladder in adults
Setting: outpatient clinics
Intervention: acupuncture
Comparison: no treatment

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with no treatment	**Risk with acupuncture**				
Overactive bladder symptoms cured or improved Assessed with ICIQ-SF	One study compared active treatment with acupuncture to women on a waiting list (no treatment group). Urinary symptoms were assessed using the ICIQ-SF after 12 weeks. The acupuncture group had a median score of 6.5 (IQR 4); the no treatment group had a median score of 10 (IQR 7.3). There were 12 participants in both groups.		—	24 (1 RCT)	⊕⊝⊝⊝ Very low[a,b]	The evidence is very uncertain about the effect of acupuncture versus no treatment on the cure or improvement of overactive bladder symptoms.
Number of major adverse events	There were no incidences of major adverse events in the included study.		—	24 (1 RCT)	⊕⊝⊝⊝ Very low[a,b]	The evidence is very uncertain about the effect of acupuncture on the number of major adverse events.
Number of minor adverse events	There were 2 minor adverse events reported in the acupuncture group; 1 of tiredness and 1 of an initial increase in urinary symptoms. There were no reports of minor adverse events in the no treatment group.		—	24 (1 RCT)	⊕⊝⊝⊝ Very low[a,b]	The evidence is very uncertain about the effect of acupuncture on the number of minor adverse events.
Presence or absence of urinary urgency	This outcome was not reported.					
Episodes of urinary incontinence in a 24-hour period	This outcome was not reported.					

Daytime urinary frequency	This outcome was not reported.
Episodes of nocturia	This outcome was not reported.

* **The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI)

CI: confidence interval; ICIQ-SF: International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form; IQR: interquartile range; RCT: randomised controlled trial

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[a]Downgraded once for serious risk of bias: concerns surrounding lack of blinding of participants, study personnel and outcome assessors.
[b]Downgraded once for very serious imprecision: small sample sizes.

Summary of findings 2.   Acupuncture compared to sham acupuncture for overactive bladder in adults

Acupuncture compared to sham acupuncture for overactive bladder in adults

Patient or population: overactive bladder in adults
Setting: outpatient clinics
Intervention: acupuncture
Comparison: sham acupuncture

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with sham acupuncture	Risk with acupuncture				
Overactive bladder symptoms cured or improved Assessed with a validated urinary symptoms	—	—	**SMD -0.36** (-1.03 lower to 0.31 higher)	151 (3 RCTs)	⊕⊖⊖⊖ Very low[a, b, c]	The evidence is very uncertain about the effect of acupuncture on the cure or improvement of urinary symptoms.

Outcome				No of participants (studies)	Certainty	Comments
patient reported outcome measure						
Number of major adverse events	There were no incidences of major adverse events in any of the included studies.			236 (5 RCTs)	⊕⊕⊖⊖ Low[d]	The number of participants is too low to detect a rare event.
Number of minor adverse events	28 per 1000	**36** per 1000 (8.4 to 150)	**RR 1.28** (0.30 to 5.36)	222 (4 RCTs)	⊕⊕⊕⊖ Moderate[c]	There is no evidence of a difference in the number of minor adverse events
Presence or absence of urinary urgency Assessed with bladder diary data - episodes per day	Mean **7.69** episodes per day	Mean **3.17** episodes per day (0 to 9.98)	**MD 4.52 lower** (11.33 lower to 2.29 higher)	25 (1 RCT)	⊕⊖⊖⊖ Very low[e, f]	The evidence is very uncertain about the effect of acupuncture on the presence or absence of urinary urgency. The lower confidence interval is implausible.
Episodes of urinary incontinence in a 24-hour period	Mean **2.5** episodes in a 24-hour period	Mean **3.05** episodes in a 24-hour period (0.99 to 5.1)	**MD 0.55 higher** (1.51 lower to 2.60 higher)	121 (2 RCTs)	⊕⊕⊕⊖ Moderate[c]	Acupuncture probably results in little to no difference in episodes of urinary incontinence in a 24-hour period.
Daytime urinary frequency Assessed with bladder diary data - episodes per day	Two studies reported on frequency of micturition. One study reported the number of voiding episodes in a 24-hour period: true acupuncture mean 11.58 versus sham acupuncture mean 13.62. One study compared time between voids. Following treatment, 11 in the acupuncture group could delay more than 2 hours between voids versus 0 in the sham acupuncture group.			77 (2 RCTs)	⊕⊖⊖⊖ Very low[g, h]	The evidence is very uncertain about the effect of acupuncture on daytime urinary frequency
Episodes of nocturia Assessed with bladder diary data - episodes per night	Mean**3.85** episodes of nocturia per night	Mean**1.33** (0 to 4.09)	**MD 2.52 lower** (4.80 lower to 0.24 lower)	25 (1 RCT)	⊕⊖⊖⊖ Very low[e, f]	The evidence is very uncertain about the effect of acupuncture on episodes of nocturia. The lower confidence interval is implausible.

* **The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI)

CI: confidence interval; MD: mean difference; RCT: randomised controlled trial; RR: risk ratio; SMD: standardised mean difference

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

[a]Downgraded once for serious risk of bias: lack of blinding of outcome assessors.
[b]Downgraded once for serious inconsistency: moderate heterogeneity between studies.
[c]Downgraded once for serious imprecision: small sample sizes.
[d]Downgraded twice for very serious imprecision: small numbers of participants to detect a rare event.
[e]Downgraded once for serious risk of bias: lack of blinding to group allocation for all outcomes.
[f]Downgraded twice for very serious imprecision: small participant numbers and very wide confidence intervals.
[g]Downgraded once for serious risk of bias: lack of blinding of outcome assessors.
[h]Downgraded once for indirectness: different ways of measuring the outcome used.

Summary of findings 3. Acupuncture compared to medication for overactive bladder in adults

Acupuncture compared to medication for overactive bladder in adults

Patient or population: overactive bladder in adults
Setting: outpatient clinics
Intervention: acupuncture
Comparison: medication

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with medication	**Risk with acupuncture**				
Overactive bladder symptoms cured or improved Assessed with total effective rate	**703 per 1000**	**879 per 1000** (773 to 1000)	**RR 1.25** (1.10 to 1.43)	258 (5 RCTs)	⊕⊕⊖⊖ Low[a, b]	Acupuncture may result in a slight increase in cure or improvement in urinary symptoms. The upper limit in the risk with acupuncture group is implausible.
Number of major adverse events	No studies reported any major adverse effects			927 (14 RCTs)	⊕⊕⊖⊖ Low[c]	The number of participants is too low to detect a rare event.
Number of minor adverse events	**307 per 1000**	**77 per 1000** (56 to 107)	**RR 0.34** (0.26 to 0.45)	1004 (8 RCTs)	⊕⊕⊖⊖ Low[d, e]	Acupuncture may reduce the number of minor adverse events.

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Presence or absence of urinary urgency Assessed with episodes per day	Mean **2.36** episodes per day	Mean **1.96** (1.8 to 2.12)	**MD 0.4 lower** (0.56 lower to 0.24 lower)	80 (2 RCTs)	⊕⊝⊝⊝ Very low[f, g]	The evidence is uncertain about the effect of acupuncture on presence or absence of urinary urgency.
Daytime urinary frequency Assessed with voids per day	Mean **8.47** voids per day	Mean**9.2** (8.1 to 10.3)	**MD 0.73 higher** (0.39 lower to 1.85 higher)	360 (4 RCTs)	⊕⊕⊝⊝ Low[b,h]	Acupuncture may result in little to no effect on daytime frequency.
Episodes of urinary incontinence in a 24-hour period	Mean **1.17** episodes per day	Mean **0.84** (0 to 3.26)	**MD 0.33 lower** (2.75 lower to 2.09 higher)	20 (1 RCT)	⊕⊝⊝⊝ Very low[i]	The evidence is very uncertain about the effect of acupuncture on episodes of urinary incontinence in a 24-hour period.
Episodes of nocturia Assessed with episodes per night	Mean **1.63** episodes per night	Mean **1.13** (0.98 to 1.27)	**MD 0.5 lower** (0.65 lower to 0.36 lower)	80 (2 RCTs)	⊕⊕⊝⊝ Low[f,g]	Acupuncture may reduce episodes of nocturia slightly.

* **The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI)

CI: confidence interval; MD: mean difference; RCT: randomised controlled trial; RR: risk ratio

GRADE Working Group grades of evidence

High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.

Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.

Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[a]Downgraded once for serious risk of bias: two studies have at least one category judged at high risk of bias.

[b]Downgraded once for serious imprecision: small numbers of participants.

[c]Downgraded twice for very serious imprecision: low participant numbers to detect a rare event.

[d]Downgraded once for serious imprecision: wide confidence intervals.

[e]Downgraded once for serious imprecision: high heterogeneity between studies.

[f]Downgraded once for serious risk of bias: unclear risk of bias in several categories in both studies.

[g]Downgraded twice for very serious imprecision: small numbers of participants and very wide confidence intervals in both studies.

[h]Downgraded once for serious risk of bias: all studies had at least one category judged at unclear risk of bias.

[i]Downgraded twice for very serious imprecision due to very small numbers of participants.

BACKGROUND

For a glossary of terms used, see Appendix 1.

Description of the condition

Overactive bladder (OAB) is defined by the International Continence Society as "urinary urgency, usually accompanied by frequency and nocturia, with or without urgency urinary incontinence, in the absence of urinary tract infection or other obvious pathology" (Abrams 2017). Overactive bladder can be further categorised into "OAB-dry" (where urinary incontinence is absent) and "OAB-wet" (where urinary incontinence is present) (Abrams 2017). Abrams 2012 reported that urinary frequency accompanies overactive bladder in 20% to 25% of cases, and nocturia in 70% to 75% of cases. Around one in three people with overactive bladder also experience urinary incontinence (Irwin 2006).

Overactive bladder is common. An epidemiological study conducted in five countries (Canada, Sweden, Italy, Germany and the UK), including 19,165 participants, reported that 11.8% of the population had overactive bladder symptoms, with slightly more women affected (12.8%) than men (10.8%) (Irwin 2006). This is equivalent to one in nine of the general adult population (Irwin 2006). Furthermore, the prevalence of overactive bladder increases with age: symptoms are reported to occur in 40% of men and 46% of women aged 65 years or over (Sexton 2011).

The exact pathophysiology underlying overactive bladder is not fully understood but several processes are believed to contribute to developing symptoms (Malde 2018). These processes include: abnormal secretion of acetylcholine during bladder filling, which may result in afferent activation; compounds released by urothelial cells, which may affect cell signalling; alteration in smooth muscle properties; abnormal afferent activity resulting in increased efferent responses, which compromises voluntary bladder control; and altered cognitive responses, specifically in the orbitofrontal cortex.

Overactive bladder is usually diagnosed by a thorough history and physical examination. Validated symptom questionnaires are used to document and quantify symptoms, while clinical examination can help to exclude other causes of lower urinary tract symptoms (LUTS). A bladder diary can assess the frequency and severity of symptoms (NICE 2019).

Overactive bladder is most often present when there is no underlying neurological disease; this is known as idiopathic overactive bladder. However, it is also sometimes associated with neurological conditions, including stroke, Parkinson's disease, multiple sclerosis and spinal cord injury. People presenting with overactive bladder should be screened to rule out neurological causes (Tse 2016).

In one survey, 88% of participants reported experiencing symptoms for over 10 years (Rantell 2017). Participants reported negative effects on physical, social, domestic, occupational and sexual domains. Overactive bladder is a long-term condition that reduces quality of life, leading to increased anxiety and depression and a negative effect on self-esteem (Lai 2016; Tubaro 2004; Wein 2009). Additionally, it has been reported that people with LUTS and depression are at a greater risk of developing dementia (Ou 2019).

Given the high prevalence of overactive bladder, treatment costs are significant. The National Overactive Bladder Evaluation Programme (NOBLE) cited the cost of treating overactive bladder in the USA as USD 12.02 billion (Hu 2003). A further study estimated that the cost of providing care would rise with an aging population; projected costs for 2020 were USD 82.6 billion per annum (Ganz 2010). In addition to the clinical implications and quality of life implications associated with overactive bladder, there are significant implications associated with its management. For example, a recent review found that direct overactive bladder related costs in the US ranged between USD 656 to 860 per patient annually (USD 2016) (Powell 2018). This demonstrates the importance of finding management strategies that are both clinically effective in managing symptoms and also a good use of resources for the healthcare system.

Description of the intervention

Initial treatment for overactive bladder includes lifestyle modification, pelvic floor exercises and fluid management. Where these are unsuccessful, people are offered anticholinergic drugs or β3-adrenoreceptor agonists. If medications do not control symptoms, surgical interventions may be required. Surgical treatment for overactive bladder includes intravesical botulinum toxin injection, sacral neuromodulation, augmentation cystoplasty and urinary diversion (NICE 2019). Although acupuncture is not currently offered universally as a treatment for overactive bladder, there is a growing body of literature that reports positive outcomes for overactive bladder sufferers (Aydoğmuş 2014; Yuan 2015; Zhao 2018).

Acupuncture refers to the practice of inserting multiple fine needles throughout the body in order to achieve a positive physiological response (White 2009). Needling can be performed: within the dermatome of the affected area; at prominent acupoints found throughout the body which, according to Traditional Chinese Medicine (TCM) theory, have specific effects on symptoms; on the visible part of the ear (the auricle); and with the addition of electrical stimulation (electroacupuncture). Acupuncture has been adapted by specific cultures (for example, Japanese and Korean acupuncture) and can take many alternative forms.

Acupuncture is practised widely throughout Asia, Europe and Northern America and has a low adverse event risk profile, with the most common adverse events being reported as transient (Clarkson 2015; MacPherson 2001). Examples of adverse events reported in the literature include bleeding at the site of needle insertion, pain at the site of the inserted needle or an initial increase in pain at the site of injury (Witt 2009).

A typical acupuncture session may last between 15 and 40 minutes. Needles may be stimulated, either manually by the clinician (needles turned in the acupoint) periodically throughout the session, or continually through an electroacupuncture device that delivers an electrical current. The frequency and duration of treatment may vary depending on clinician preference and patient response.

How the intervention might work

While the exact mechanism by which acupuncture may influence overactive bladder remains unclear, several theories exist. Sensory information from afferent nerves from the pelvic, pudendal and

hypogastric nerve roots directly relate to the lower urinary tract (Pullman 2016). Needling within the skin and muscles that these nerves supply may reduce overactive bladder through inhibition of peripheral nerves (Hino 2010), via brain areas that control bladder activity (Wang 2012). Furthermore, the brain bladder control matrix, where the periaqueductal gray, limbic system and prefrontal cortex are believed to have a large influence upon the bladder's function, have been found to alter during and after a course of acupuncture (Dhond 2008; Huang 2012). This infers that the beneficial effects of acupuncture on overactive bladder symptoms could be partially explained through signalling changes from the central nervous system to the bladder. Acupuncture has been shown to exert an effect on the autonomic nervous system (Napadow 2013), further endorsing the view that acupuncture can influence the nervous system and therefore may affect symptoms arising from a disturbance in this system.

In Traditional Chinese Medicine (TCM) theory, the maintenance of health and well-being is dependent upon the quality of energy (Qi), which emanates from the visceral organs. When Qi becomes unbalanced, symptoms of ill health occur. In the case of overactive bladder, this would be attributable to deficient kidney and bladder Qi (Maciocia 2007). In TCM, Qi is thought to pass through the body via channels called meridians. These are not anatomical structures and some dispute their existence. Acupoints on the bladder, kidney and spleen meridians are believed to directly benefit urinary symptoms by restoring Qi balance (Maciocia 2007). There is debate between acupuncture practitioners regarding the concepts described and further high-quality research is required to explore the putative mechanisms underpinning the observed effects of acupuncture.

Why it is important to do this review

There are specific concerns and side effects linked to some treatments for overactive bladder. The additive effect of anticholingeric medications may be linked to the development of dementia (Gray 2015). Surgical treatments are invasive, may be contraindicated, or carry a significant risk in older people who are more likely to have co-morbidities. Surgical interventions have a significantly higher risk profile and recovery period when compared to acupuncture (NICE 2019; Witt 2009). In light of this, it is important to investigate alternative strategies for managing overactive bladder.

Published Cochrane Reviews concerning the treatment of overactive bladder include: anticholinergics (Madhuvrata 2012); implanted sacral neuromodulation (Herbison 2009); onabotulinumtoxin A (Duthie 2011); and bladder training (Wallace 2004). Currently, the role of acupuncture in the treatment of overactive bladder has not been assessed in a Cochrane Review. The efficacy of acupuncture is uncertain; there is no consensus with regard to treatment protocols and it is anticipated that some of the research available may be of poor quality (Forde 2016). Therefore, this review aims to establish the risk of bias and quality of reporting and clinical outcomes of existing acupuncture research for overactive bladder.

O B J E C T I V E S

To assess the effects of acupuncture for treating overactive bladder in adults.

M E T H O D S

Criteria for considering studies for this review

Types of studies

We included randomised controlled trials (RCTs), quasi-RCTs (in which randomisation may be predictable, such as the allocation of participants by day of the week, date of birth or sequence of entry into the trial), and cross-over trials of acupuncture for treating overactive bladder in adults.

Types of participants

We included studies of adults aged over 18 years with a diagnosis of overactive bladder that fits the criteria defined by the International Continence Society as "urinary urgency, usually accompanied by frequency and nocturia, with or without urgency urinary incontinence, in the absence of urinary tract infection or other obvious pathology" (Abrams 2017).

This review addresses treatment for idiopathic overactive bladder; we therefore excluded participants who have overactive bladder symptoms that are a manifestation of a neurological condition (e.g. multiple sclerosis, Parkinson's disease, stroke).

Types of interventions

We included studies of acupuncture that intended to treat the symptoms of overactive bladder, which involved needle insertion at defined acupuncture points. This includes body acupuncture, scalp acupuncture, auricular acupuncture and electro-acupuncture. We sought clarification from study authors if the type of acupuncture used in a trial was not clear.

Sham acupuncture is designed to assist with blinding participants about the type of treatment they are receiving. It can be delivered using a needle that appears to pierce the skin but does not, or by inserting needles at non-acupuncture points.

We included the following comparators.

- Acupuncture versus no treatment
- Acupuncture versus sham acupuncture
- Acupuncture versus conservative treatments (including bladder retraining, fluid management, pelvic floor rehabilitation, weight loss and smoking cessation)
- Acupuncture versus medication for overactive bladder

We believe that the comparisons of particular interest to patients and practitioners are acupuncture versus no treatment or sham acupuncture, and acupuncture versus medication for symptoms of overactive bladder.

Types of outcome measures

We included validated urinary symptom and incontinence-specific, patient-reported outcome measures in this review.

Primary outcomes

- Number of participants whose overactive bladder symptoms were cured or improved, assessed using validated urinary symptom and incontinence-specific patient-reported outcome measures (e.g. the Bristol Female Lower Urinary Tract Symptoms questionnaire (BFLUTS) (Hiller 2002),

International Consultation on Incontinence Questionnaire-Urinary Incontinence (ICIQ-UI) (Avery 2004), three-day bladder diaries (Jimenez-Cidre 2015)). Numbers of participants defined as cured in studies were reported. Where cure rates were not used, we used symptom improvement rates.

- Number of major adverse events (i.e. death, serious infection from needle insertion, pneumothorax from needle insertion, any complication resulting in hospitalisation as an inpatient or an outpatient).
- Number of minor adverse events (i.e. fainting, vomiting, pain on needle insertion, bleeding on needle removal, bruising and fatigue).

Secondary outcomes

- Presence or absence of urinary urgency (measured by patient-reported outcomes).
- Daytime urinary frequency (i.e. number of voids during waking hours measured by patient-reported outcomes).
- Episodes of urinary incontinence in a 24-hour period (measured by patient-reported outcomes).
- Episodes of nocturia (i.e. number of voids after going to sleep and prior to waking measured by patient-reported outcomes).
- Improvement in objective measures of urinary incontinence (i.e. urodynamic testing parameters).
- Improvement in general quality of life (assessed using validated scores, e.g. EQ-5D (Rabin 2001), medical outcomes SF-36 (Ware 1992), ICEpop CAPability measure for Adults (ICECAP A) (Al-Janabi 2013)).

Timing of outcome assessment

We included outcome measures that are applied as follows.

- Within three weeks of randomisation (baseline measurement)
- Within 12 weeks of commencing treatment (short-term outcomes)
- Longer than 12 weeks after commencing treatment (long-term outcomes)

Acupuncture treatments for overactive bladder symptoms are usually applied on at least a weekly basis. Studies varied in the number of treatments given, with usual practice between 4 and 12 treatments. Acupuncture is thought to have a carryover treatment effect and so the measurement of long-term outcomes is of interest in this review.

Main outcomes for summary of findings tables

- Number of participants whose overactive bladder symptoms were cured or improved
- Number of major adverse events
- Number of minor adverse events
- Presence or absence of urinary urgency
- Daytime urinary frequency
- Episodes of urinary incontinence in a 24-hour period
- Episodes of nocturia (i.e. number of voids after going to sleep and prior to waking)

Where not otherwise indicated, all outcomes for the summary of findings tables were measured within 12 weeks of commencing treatment (i.e. short-term).

Search methods for identification of studies

We did not impose any language or other limitations on any of the searches described below.

Electronic searches

Search for clinical effectiveness studies

We identified relevant trials from the Cochrane Incontinence Specialised Register. For more details of the search methods used to build the Specialised Register, please see the Group's webpages where details of the Register's development (from inception) and the most recent searches performed to populate the Register can be found. To summarise, the Register contains trials identified from the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, MEDLINE In-Process, In-Data-Review and Other Non-Indexed Citations, MEDLINE Epub Ahead of Print, MEDLINE Daily, ClinicalTrials.gov, WHO ICTRP and handsearching of journals and conference proceedings. Many of the trials in the Cochrane Incontinence Specialised Register are also contained in CENTRAL.

The date of the most recent search of the Cochrane Incontinence Specialised Register for this review is 14 May 2022.

The terms that we used to search the Cochrane Incontinence Specialised Register are given in Appendix 2.

We also searched the Allied and Complementary Medicine database (AMED) on EBSCOhost.

The date of the most recent search was on 14 May 2022.

The terms that we used to search AMED are given in Appendix 3.

In addition, two of the review authors searched the following electronic bibliographic databases, where knowledge of the Chinese language is necessary.

- China National Knowledge Infrastructure (CNKI);
- Chinese Science and Technology Periodical Database (VIP); and
- WANFANG (China Online Journals).

The date of the most recent search of these databases was 10 February 2021 and the search strategies used are given in Appendix 4.

Search for economic evaluations

We performed additional searches for the brief economic commentary (BEC). We searched the Cochrane Incontinence Specialised Register of Economic Evaluations, which consists of searches of:

- NHS Economic Evaluation Database (NHS EED) on the UK Centre for Reviews and Dissemination (CRD) website (covering from the earliest record in NHS EED, dating from 1968, up to and including 31 December 2014 when their coverage ended).

As NHS EED is no longer actively updated, we performed additional searches of the following databases to identify eligible studies added to these databases from 1 January 2015 onwards:

- MEDLINE on OvidSP (covering 1 January 1946 to June Week 5 2022); and

- Embase (on OvidSP) (covering 1 January 1974 to 2022 Week 27).

The date of the most recent search was 11 July 2022 and the details of the searches performed can be found in Appendix 5.

Searching other resources

We searched the reference lists of included studies and relevant systematic reviews.

Data collection and analysis

We conducted data collection and analysis in accordance with methods specified in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2019).

Selection of studies

As we anticipated that a proportion of studies would be available only in Mandarin, four review authors formed pairs to select studies and extract data (EH and CC for English language studies and YYZ and XWZ for Mandarin language studies). Both pairs of review authors used the same software, screening and data extraction processes.

Using Covidence, the above pairs of review authors independently screened the titles and abstracts identified by the search. We obtained the full text of potentially relevant reports and assessed these against the review's inclusion criteria. We compared and discussed their results and resolved disagreements by consulting another review author (KB).

Data extraction and management

Using Covidence, pairs of review authors (EH and CC for English language studies and YYZ and XWZ for Mandarin language studies) independently extracted data from the included studies. We compared and discussed data extraction forms for each study. A third review author (GB) resolved any disagreements.

Assessment of risk of bias in included studies

We used Cochrane's risk of bias tool to assess the risk of bias in the included studies (Higgins 2011). Two pairs of review authors (EH and CC for English language studies and YYZ and XWZ for Mandarin language studies) individually assessed each of the identified studies against the six domains: random sequence generation, allocation concealment, blinding of participants and study personnel, blinding of outcome assessors, incomplete outcome data, selective outcome reporting and any other source of potential bias. For each domain, we rated the study as either at 'high', 'low' or 'unclear' risk of bias. A third review author (KB) arbitrated any disagreements.

Measures of treatment effect

We used Review Manager Web (RMW) to perform statistical analysis of the data collected from the selected studies (RevMan Web 2020). One review author (EH) was responsible for data entry into RevManWeb and a second review author (CC) checked the process.

For dichotomous outcome data, we measured the treatment effect using risk ratios (RR) with 95% confidence intervals (CIs). For continuous outcome data, we used mean difference (MD) values with 95% CIs to measure treatment effect.

If identified studies used differing scales to measure the same outcome, it was necessary to use the standardised mean difference (SMD) with 95% CIs. We considered this necessary in order to express the size of the intervention effect in each study, relative to the between-participant variability in outcome measurements observed in studies as per guidance given in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2019).

Unit of analysis issues

We intended to include studies using a cross-over design if they met the inclusion criteria and would have applied the guidance of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2019). Where studies are available in future updates, the risk of bias assessment will pay particular attention to the dropout rate following first treatment, the randomisation process to first treatment and the reporting of these events. If the dropout rate following the first treatment is high and the study reports first treatment only data, we will exclude these studies. An assessment of the effect of carryover from treatment one to treatment two will be made and, if it is felt that the treatment carryover would significantly affect the reported results, these studies will be excluded from the review.

If insufficient detail is reported in studies to make the judgements described above, we will contact study authors in order to obtain the details required.

If there is a group of cross-over studies reporting the results of a paired analysis (i.e. as a MD), we could use the generic inverse-variance method (GIV) to perform a meta-analysis or meta-regression as required.

In studies using multiple arm designs where treatments were studied in isolation and as a combined treatment, we used only the data from the stand-alone arms.

Dealing with missing data

We included studies reporting results using an intention-to-treat (ITT) analysis if the participants were analysed in the study arm to which they were originally assigned.

If there were missing data reported that could be calculated using recognised statistical methods, we performed these calculations. We used the conventional analysis of meta-analysis only if individuals with available data were adequate and when we were confident that the data were missing at random (MAR) in every study (i.e. that the probability of missing data does not depend on unobserved outcomes, conditional on observed variables).

However, if data were not missing at random, we used two methods based on plausible assumptions about the missing data. We imputed missing values based on the distribution of reasons for missing data. After specifying the magnitude and uncertainty of possible departures from the missing at random assumption, we used these to correct bias and re-weight the studies by employing a pattern mixture model and describing how the outcome in the missing participants is related to the outcome in the completers. This relationship was informed using expert opinion in the review author team.

Assessment of heterogeneity

We assessed the heterogeneity of studies by producing forest plots and using the Chi² test and I² statistic in the RMW software (RevMan Web 2020). This allowed us to assess heterogeneity and decide whether a meaningful meta-analysis could be performed. The assessment of heterogeneity was guided by the *Cochrane Handbook for Systematic Reviews of Interventions* as follows (Higgins 2019).

- 0% to 40%: might not be important
- 30% to 60%: may represent moderate heterogeneity
- 50% to 90%: may represent substantial heterogeneity
- 75% to 100%: considerable heterogeneity

Assessment of reporting biases

Had sufficient studies been identified, we would have produced funnel plots to explore publication bias.

Data synthesis

We synthesised the data collected using RevMan Web (RevMan Web 2020). We generated forest plots for each outcome and used a fixed-effect model. We examined the heterogeneity of effect sizes using the Chi² test and I² statistic. If data were homogeneous, we used a fixed-effect model and if the data were heterogeneous, we used a random-effects model. Where meta-analyses were not possible, we undertook a narrative synthesis of results.

Subgroup analysis and investigation of heterogeneity

We planned to perform the following subgroup analyses, had the data allowed.

- Sex (male versus female)
- Form of acupuncture (body acupuncture versus electro-acupuncture versus auricular)
- Age (under 65 years versus over 65 years)

Sensitivity analysis

Had the data allowed, we planned to employ sensitivity analysis to examine the effect of a single study on the overall estimation, if the data suggested this was required (i.e. if the eligibility of some included studies was dubious due to missing data).

Had the data allowed, we planned to perform a cumulative meta-analysis using Stata software (Stata 2019), where studies are added one at a time in a specified order according to date of publication or quality to check the contribution of added studies.

Incorporating economic evidence

Following the search outlined in the Search methods for identification of studies, we would have developed a BEC to summarise the availability and principal findings of the full economic evaluations that compare acupuncture with other treatments, had any relevant studies been found (Aluko 2022). This BEC would have encompassed full economic evaluations (i.e. cost-effectiveness analyses, cost-utility analyses and cost-benefit analyses) conducted as part of a single empirical study, such as a RCT, a model based on a single such study, or a model based on several such studies.

Summary of findings and assessment of the certainty of the evidence

We prepared summary of findings tables using the GRADEpro GDT software for the three comparisons pre-stated in the Types of interventions: acupuncture versus no treatment, acupuncture versus sham acupuncture and acupuncture versus medication for overactive bladder.

We used the GRADE approach to assess the certainty of evidence related to the 'Main outcomes for summary of findings tables' as listed in the Types of outcome measures (Schünemann 2019). We used the five GRADE considerations (study limitations, consistency of effect, imprecision, indirectness and publication bias) and graded the certainty of the evidence as high, moderate, low or very low. We justified all decisions to downgrade the certainty of trials using footnotes.

R E S U L T S

Description of studies

Results of the search

Search for clinical effectiveness studies

An initial literature search was undertaken on 27 January 2020 and further searches were conducted on 1 March 2021 and 14 May 2022. We identified 592 reports and removed 82 of these as duplicates. We screened 510 abstracts against the review criteria and excluded 390. We obtained 120 full-text reports and excluded 84; the reasons for exclusion are detailed in the Excluded studies section. There were eight reports of six studies that we classified as ongoing and two studies are awaiting classification. We included 15 studies (25 reports) in the review. The flow of studies through the assessment process is represented in Figure 1.

Figure 1. PRISMA flow diagram - clinical effectiveness studies


```
┌─────────────────────┐
│ 592 records         │
│ identified through  │
│ database searching  │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│ 510 records after   │
│ 82 duplicates       │
│ removed             │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐        ┌─────────────────────┐
│ 510 records         │───────▶│ 390 records         │
│ screened            │        │ excluded            │
└─────────────────────┘        └─────────────────────┘
```

85 reports of 84 studies excluded

Reasons:

Design did not meet review criteria = 28

Population did not have a diagnosis of overactive bladder = 34

Intervention did not meet review criteria = 15

Comparator did not meet review criteria = 5

Letters to journal editors = 2

120 full-text articles assessed for eligibility

15 studies with 25 reports were included in the narrative synthesis. Additionally there were:

- 6 ongoing studies with 7 reports identified in searches; and

Figure 1.   (Continued)

```
identified in
searches; and

- 2 studies awaiting
classification were
identified in
searches.
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```
15 studies with 25
reports were
included in the
quantitative
synthesis
(meta-analysis)
```

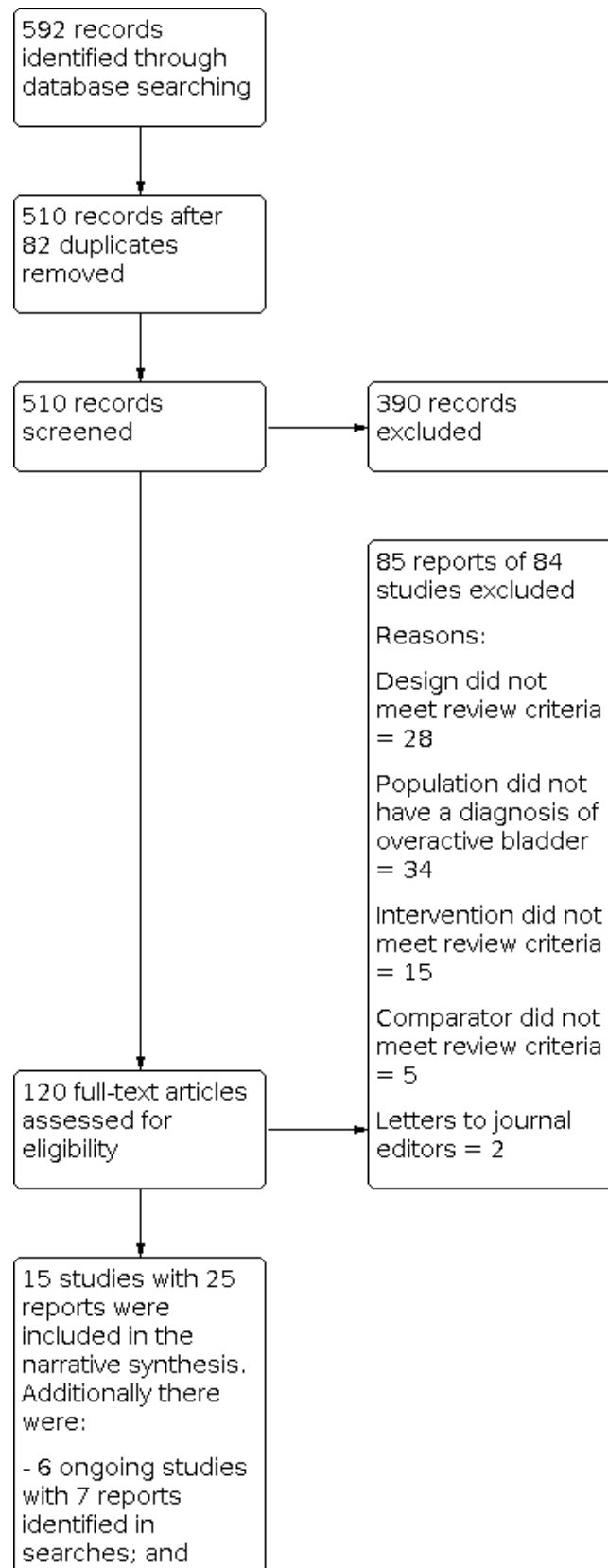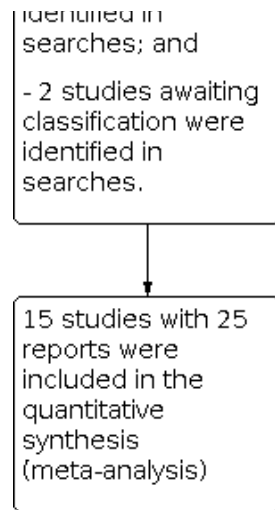***Search for economic evaluations***

The search for potentially relevant records produced a total of 437 records to screen. The results of the economic search yielded no economic evaluations assessing the use of acupuncture for treating overactive bladder in adults. The flow of literature through the assessment process is shown in Figure 2.

Figure 2.   PRISMA flow diagram - brief economic commentary (BEC)

Included studies

Fifteen studies met the inclusion criteria. Full details are included in the Characteristics of included studies table.

Design

Of the 15 included studies, 14 were RCTs and one was a quasi-RCT (Hong 2015). Three studies incorporated three arms in their design (Aydoğmuş 2014; Solberg 2016; Yang 2016).

Sample sizes

In total, the 15 included studies involved 1395 participants. The mean number of participants per study was 93. Overall, the sample sizes in the included studies were small; only 40% of studies had more than 50 participants (Aydoğmuş 2014; Hong 2015; Lin 2020; Liu 2019; Wang 2013a; Yuan 2015). Two studies contributed 53% of the total participants included in the review, with 500 and 240 participants respectively (Liu 2019; Yuan 2015).

Setting

The majority of the studies were conducted in China (Chen 2009; Hong 2015; Liu 2019; Lin 2020; Shen 2020; Wang 2011; Wang 2013a; Yang 2016; Yu 2012; Yuan 2015; Zhang 2015). Other studies were conducted in: the USA (Engberg 2009); the UK (Kelleher 1994); Turkey (Aydoğmuş 2014); and Norway (Solberg 2016).

Thirteen studies were conducted in hospitals (Aydoğmuş 2014; Chen 2009; Hong 2015; Kelleher 1994; Lin 2020; Liu 2019; Shen 2020; Wang 2011; Wang 2013a; Yang 2016; Yu 2012; Yuan 2015; Zhang 2015). Two were conducted in university settings (Engberg 2009; Solberg 2016).

Thirteen studies were conducted on a single site (Aydoğmuş 2014; Chen 2009; Engberg 2009; Hong 2015; Kelleher 1994; Shen 2020; Solberg 2016; Wang 2011; Wang 2013a; Yang 2016; Yu 2012; Yuan 2015; Zhang 2015). One study was a multicentre trial conducted across 10 sites (Liu 2019), while another study was conducted at two sites in Hong Kong (Lin 2020).

Funding sources

Of the 15 included studies, four were supported by Chinese Government-funded research grants (Hong 2015; Lin 2020; Liu 2019; Shen 2020), and two were funded by Higher Education institutions (Engberg 2009; Wang 2013a). The open access publishing fee for one study was paid by the Norwegian Acupuncture Association (Solberg 2016). Eight studies did not report any source of funding (Aydoğmuş 2014; Chen 2009; Kelleher 1994; Wang 2011; Yang 2016; Yu 2012; Yuan 2015; Zhang 2015).

Participants

The presenting condition for all participants was overactive bladder or overactive bladder-predominant mixed urinary incontinence (MUI). How this diagnosis was made varied between studies. Four studies used Chinese national diagnostic criteria (Hong 2015; Shen 2020; Yang 2016; Yu 2012). Four studies used the International Continence Society definition of overactive bladder (Aydoğmuş 2014; Lin 2020; Wang 2011; Zhang 2015). Five studies used self-reported symptoms including urinary urgency, urge incontinence and frequency of urination (Chen 2009; Kelleher 1994; Solberg 2016; Wang 2013a; Yuan 2015). Two studies used objective measures of urinary symptoms, including three-day bladder diaries and validated questionnaires (Engberg 2009; Liu 2019).

Ten studies included only women (Aydoğmuş 2014; Engberg 2009; Kelleher 1994; Liu 2019; Shen 2020; Solberg 2016; Wang 2011; Wang 2013a; Yuan 2015; Zhang 2015). One study only included men (Chen 2009), while two studies included both sexes (Lin 2020; Yu 2012). Two studies did not report the sex of participants (Hong 2015; Yang 2016).

The mean age of participants was recorded in 11 studies (Aydoğmuş 2014; Chen 2009; Engberg 2009; Hong 2015; Kelleher 1994; Lin 2020; Liu 2019; Solberg 2016; Yang 2016; Yuan 2015; Zhang 2015). The mean age of participants in these 11 studies was 49.6 years with a range of 18 to 87 years. Two studies reported the age range of participants: 51 to 79 years (Wang 2011), and 35 to 60 years (Wang 2013a). One study described the median age of participants as 35.2 years (Yu 2012), while one study did not report the age of participants (Shen 2020).

Studies varied widely in the amount of demographic data collected on participants. However, there were some identifiable themes, including body mass index (BMI) (Engberg 2009; Liu 2019; Zhang 2015), duration of symptoms (Hong 2015; Kelleher 1994; Liu 2019), race (Engberg 2009; Liu 2019), presence of co-morbidities (Engberg 2009; Liu 2019), and parity (Aydoğmuş 2014; Liu 2019; Solberg 2016). Four studies did not report any demographic baseline data apart from sex (Shen 2020; Wang 2011; Wang 2013a; Yu 2012).

Interventions

This review included studies that employed acupuncture that pierced the skin, including body, scalp and auricular acupuncture practices with or without electrical stimulation. No studies employed solely scalp or auricular acupoints. Traditional acupuncture was used in nine studies (Aydoğmuş 2014; Engberg 2009; Kelleher 1994; Lin 2020; Solberg 2016; Wang 2011; Wang 2013a; Yu 2012; Yuan 2015). Electro-acupuncture was used in six studies (Chen 2009; Hong 2015; Liu 2019; Shen 2020; Yang 2016; Zhang 2015).

The number of treatments, number of needles used and length of follow-up are summarised in Table 1. Individual study treatment protocols are documented in the Characteristics of included studies.

Comparators were grouped into: sham acupuncture (five studies: Aydoğmuş 2014; Engberg 2009; Lin 2020; Yang 2016; Zhang 2015); conservative treatments (one study: Solberg 2016); and medication for overactive bladder (11 studies: Aydoğmuş 2014; Chen 2009; Hong 2015; Kelleher 1994; Liu 2019; Shen 2020; Wang 2011; Wang 2013a; Yang 2016; Yu 2012; Yuan 2015).

Medication used included solifenacin (Aydoğmuş 2014; Liu 2019; Wang 2013a), tolterodine (Chen 2009; Hong 2015; Shen 2020; Wang 2011; Yu 2012; Yuan 2015), and oxybutynin (Kelleher 1994).

Four sham studies employed non-penetrating needles (Aydoğmuş 2014; Engberg 2009; Lin 2020; Yang 2016). One sham study used penetrating needles at non-acupuncture point 15 mm to the side of known points (Zhang 2015).

Three studies used either a combined comparator arm of medication plus pelvic floor training (Liu 2019), or medication plus

bladder retraining techniques (Hong 2015; Yu 2012). These studies were included as the combination of treatments used met the criteria of this review. However, we acknowledge that this inclusion does add complexity when considering the effects of interventions as it is not clear which of the active ingredients in the combined treatment gives rise to the effect reported.

No studies were identified where no treatment was the sole comparator. However, Solberg 2016 used no intervention as one of three arms in their study. Two multi-arm studies compared acupuncture with both medication and sham acupuncture (Aydoğmuş 2014; Yang 2016). Solberg 2016 compared acupuncture with pelvic floor muscle training or no treatment.

Outcomes

Outcomes reported by the included studies varied greatly, making meaningful comparisons more challenging.

Reported cure or improvement in overactive bladder symptoms using validated patient-reported outcome measures (PROMs)

Four studies used the International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) (Aydoğmuş 2014; Hong 2015; Liu 2019; Solberg 2016). However, scores were reported in differing formats, including mean and standard deviation, median and interquartile range and percentage change scores from baseline, preventing meta-analysis of this information. Other PROMs reported by research teams included the Overactive Bladder Symptom Score (OABSS) (Lin 2020; Zhang 2015), the Urinary Distress Inventory (UDI) (Engberg 2009; Lin 2020), and the Incontinence Impact Questionnaire (IIQ) (Engberg 2009; Lin 2020).

Number of major adverse events

Ten studies specifically reported in the text of the report that no major adverse events had occurred during the study (Aydoğmuş 2014; Engberg 2009; Hong 2015; Lin 2020; Liu 2019; Shen 2020; Solberg 2016; Yang 2016; Yuan 2015; Zhang 2015). Five studies made no mention of major adverse events (Chen 2009; Kelleher 1994; Wang 2011; Wang 2013a; Yu 2012). See the information contained in Table 2.

Number of minor adverse events

Twelve studies reported minor adverse events (Aydoğmuş 2014; Engberg 2009; Hong 2015; Kelleher 1994; Lin 2020; Liu 2019; Shen 2020; Solberg 2016; Wang 2011; Yang 2016; Yuan 2015; Zhang 2015). The details can be found in Table 2. Three studies did not mention adverse events (Chen 2009; Wang 2013a; Yu 2012). In all studies, minor adverse events were discussed in the text of the report and data were restricted to counts of events.

Presence or absence of urinary urgency (measured by patient-reported outcomes)

Six studies reported on the presence or absence of urinary urgency (Kelleher 1994; Liu 2019; Shen 2020; Wang 2013a; Yang 2016; Yuan 2015). The method of reporting urgency varied between studies. Counts of events in a participant-completed bladder diary was the most common method employed and was used by five research teams (Kelleher 1994; Liu 2019; Wang 2013a; Yang 2016; Yuan 2015). In addition to bladder diary data, Kelleher 1994 used a visual analogue scale (VAS) to judge the bothersomeness of overactive bladder symptoms, including urgency. One study referred to urinary urgency scores but were not explicit regarding

the scale used (Shen 2020). All studies reported a reduction in the frequency of urinary urgency in acupuncture groups.

Daytime urinary frequency

Six studies reported on urinary frequency (Kelleher 1994; Liu 2019; Wang 2011; Wang 2013a; Yang 2016; Yuan 2015). Data regarding frequency of micturition were gathered using participant-reported bladder diary information for all six studies and all studies reported a reduction in the frequency of daytime micturition in acupuncture groups. In addition, Kelleher 1994 used a VAS to measure bothersomeness of frequency of micturition, which gave a reduction in perceived bothersomeness of frequency.

Episodes of urinary incontinence in a 24-hour period

Four studies reported on the frequency of urinary incontinence episodes (Lin 2020; Liu 2019; Yang 2016; Yuan 2015). All studies used participant-completed bladder diaries to collect data relating to incontinence episodes and all reported a reduction in the episodes of urinary incontinence in acupuncture groups. In addition, Kelleher 1994 used a VAS to measure bothersomeness of incontinence, which gave a reduction in perceived bothersomeness of incontinence.

Episodes of nocturia

Five studies reported on episodes of nocturia (Kelleher 1994; Liu 2019; Wang 2013a; Yang 2016; Yuan 2015). All studies used participant-completed bladder diaries to collect data on nocturia and all reported a reduction in episodes in acupuncture groups.

Improvement in objective measures of urinary symptoms

Four studies reported objective measures of urinary symptoms (Aydoğmuş 2014; Kelleher 1994; Lin 2020; Zhang 2015). Two studies reported measures from urodynamic testing (Kelleher 1994; Zhang 2015). Measures reported included:

- bladder volume in mL at first sensation (Zhang 2015);
- bladder volume in mL at first urge (Kelleher 1994; Zhang 2015);
- maximum bladder capacity (Kelleher 1994; Zhang 2015);
- maximum flow rate (Kelleher 1994; Zhang 2015);
- post void residual (Kelleher 1994; Zhang 2015); and
- rise in detrusor pressure during filling (Kelleher 1994).

Two studies measured nerve growth factor (NGF) levels in participants' urine samples (Aydoğmuş 2014; Lin 2020).

Improvement in general quality of life

Three studies reported quality of life scores in their results (Aydoğmuş 2014; Engberg 2009; Shen 2020). Two studies were not specific about the scale used or whether an increased or decreased score showed improvement (Aydoğmuş 2014; Shen 2020). Engberg 2009 applied the SF-36 to measure quality of life on both the physical and mental health components.

Length of studies and follow-up

The length of time studies were conducted across varied greatly; these are summarised in Table 1.

We included outcome measures that were applied as follows.

- Within three weeks of randomisation (baseline measurement)

- Within 12 weeks of commencing treatment (short-term outcomes)
- Longer than 12 weeks after commencing treatment (long-term outcomes)

Thirteen studies recorded only short-term outcomes (Aydoğmuş 2014; Chen 2009; Engberg 2009; Hong 2015; Kelleher 1994; Shen 2020; Solberg 2016; Wang 2011; Wang 2013a; Yang 2016; Yu 2012; Yuan 2015; Zhang 2015). Two studies collected data after 12 weeks (Lin 2020; Liu 2019). However, the data from these studies could not be meaningfully combined to give an indication of the short-term effects of acupuncture compared to long-term effects of acupuncture for overactive bladder.

Excluded studies

Eighty-four studies were excluded from the review for a variety of reasons, including:

- the patient population did not have a diagnosis of overactive bladder (N = 34);
- the study design did not fit the review criteria (N = 29);
- the intervention did not fit the review criteria (N = 14);
- the comparator did not fit the review criteria (N = 5); or
- it was a letter to the editor of a journal (N = 2).

Further details can be found in the Characteristics of excluded studies table.

Risk of bias in included studies

Figure 3 and Figure 4 summarise the risk of bias assessments across the included studies.

Figure 3.

Figure 4.

Random sequence generation (selection bias)
Allocation concealment (selection bias)
Blinding of participants and personnel (performance bias): All outcomes
Blinding of outcome assessment (detection bias): All outcomes
Incomplete outcome data (attrition bias): All outcomes
Selective reporting (reporting bias)
Other bias

0%   25%   50%   75%   100%

■ Low risk of bias   ■ Unclear risk of bias   ■ High risk of bias

Allocation

Random sequence generation

We considered six studies (40%) to have adequate sequence generation, using centralised, computer-generated randomisation, suggesting a low risk of selection bias (Engberg 2009; Lin 2020; Liu 2019; Shen 2020; Yuan 2015; Zhang 2015). In eight studies (53.3%), the method used for random sequence generation was unclear, with the text referring to randomisation but without an explanation of how this was undertaken (Aydoğmuş 2014; Chen 2009; Kelleher 1994; Solberg 2016; Wang 2011; Wang 2013a; Yang 2016; Yu 2012). We judged one study to be at high risk of bias for sequence generation (Hong 2015).

Allocation concealment

Three studies (20%) reported sufficient detail regarding allocation concealment techniques that resulted in a judgement of low risk of allocation concealment bias (Lin 2020; Liu 2019; Yuan 2015). These techniques included computer-generated sequences and staff who where otherwise not involved in the intervention. Twelve studies (80%) did not provide a sufficiently detailed report regarding allocation concealment to make a clear judgement (Aydoğmuş 2014; Chen 2009; Engberg 2009; Hong 2015; Kelleher 1994; Shen 2020; Solberg 2016; Wang 2011; Wang 2013a; Yang 2016; Yu 2012; Zhang 2015).

Blinding

Blinding of participants and personnel

Due to the nature of acupuncture, it is difficult to blind participants to group allocation unless a sham acupuncture procedure is employed in the study design. Five studies (33.3%) used sham acupuncture in their design (Aydoğmuş 2014; Engberg 2009; Lin 2020; Yang 2016; Zhang 2015). Of these, we judged three studies to represent low risk of bias for blinding procedures (Engberg 2009; Lin 2020; Zhang 2015). Aydoğmuş 2014 and Yang 2016 were three-arm trials with acupuncture, sham acupuncture and medication acting as comparators. The mechanism for preserving blinding was not reported in sufficient detail and, as one third of the participants were treated with medication, they were not blinded to their intervention. This led to a judgement of high risk of bias for these studies.

Ten studies (66.6%) did not employ a sham acupuncture procedure within their design (Chen 2009; Hong 2015; Kelleher 1994; Liu

2019; Shen 2020; Solberg 2016; Wang 2011; Wang 2013a; Yu 2012; Yuan 2015). Participants within these studies were aware of their treatment allocation and thus we judged them to have a high risk of performance bias. We also judged acupuncturists delivering interventions in these studies to have a high risk of performance bias.

Blinding of outcome assessment

Four studies (26.7%) were explicit in reporting that outcome assessors had been blinded to treatment group in the text of study reports, so we judged them to be at low risk of detection bias (Engberg 2009; Lin 2020; Liu 2019; Yuan 2015). Nine studies (60%) mentioned that outcome assessors were blinded to allocation group but gave insufficient detail of the processes employed to allow for a judgement of risk to be made and we therefore classified them as having unclear risk of bias (Aydoğmuş 2014; Chen 2009; Kelleher 1994; Shen 2020; Solberg 2016; Wang 2013a; Yang 2016; Yu 2012; Zhang 2015). Two studies (13.3%) did not mention blinding of outcome assessors in study reports and we judged them as having high risk of bias (Hong 2015; Wang 2011).

Incomplete outcome data

Outcome data were completely reported, including number and reasons for study attrition, in 11 studies (73.3%) (Chen 2009; Engberg 2009; Hong 2015; Kelleher 1994; Lin 2020; Liu 2019; Shen 2020; Wang 2011; Wang 2013a; Yang 2016; Zhang 2015). We therefore judged these studies as being at low risk of attrition bias. In four studies (26.7%) there was a lack of clarity regarding some data and dropouts, leading to a judgement of unclear risk of attrition bias (Aydoğmuş 2014; Solberg 2016; Yu 2012; Yuan 2015).

Selective reporting

We judged 12 studies (80%) to have reported on all expected outcomes fully and they therefore represented a low risk of reporting bias (Chen 2009; Hong 2015; Kelleher 1994; Lin 2020; Liu 2019; Shen 2020; Solberg 2016; Wang 2011; Wang 2013a; Yang 2016; Yu 2012; Zhang 2015). We judged two studies to have a high risk of bias for selective reporting. Engberg 2009 used multiple questionnaires to assess baseline status and change following the intervention but not all outcomes were fully reported. Yuan 2015 referred to adverse events in the text of the report but did not publish the data to support this. Aydoğmuş 2014 failed to give any detail regarding the format of the Turkish ICIQ-SF and did not

specify what quality of life scale was used in the study; we therefore judged the study to be at an unclear risk of reporting bias.

Other potential sources of bias

In 14 studies (93.3%), there were no concerns about other sources of bias (Chen 2009; Engberg 2009; Hong 2015; Kelleher 1994; Lin 2020; Liu 2019; Shen 2020; Solberg 2016; Wang 2011; Wang 2013a; Yang 2016; Yu 2012; Yuan 2015; Zhang 2015). We felt one study (6.7%) to be at an unclear risk of potential bias. Aydoğmuş 2014 inadequately reported baseline data to demonstrate that the groups were comparable.

Effects of interventions

See: **Summary of findings 1** Acupuncture compared to no treatment for overactive bladder in adults; **Summary of findings 2** Acupuncture compared to sham acupuncture for overactive bladder in adults; **Summary of findings 3** Acupuncture compared to medication for overactive bladder in adults

Acupuncture versus no treatment

One study with a total of 34 participants compared acupuncture with no treatment (Solberg 2016).

Primary outcomes

Number of participants whose overactive bladder symptoms were cured or improved

Solberg 2016 used the International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF) to assess urinary symptoms. The ICIQ-SF measure has a score ranging between 0 and 21 with higher scores indicating more symptoms. The evidence is very uncertain about the effect of acupuncture versus no treatment in terms of cure or improvement at 12 weeks (Analysis 1.1; Summary of findings 1; very low-certainty evidence).

Number of major adverse events

Solberg 2016 reported that there were no major adverse events during the study.

Number of minor adverse events

Solberg 2016 reported two instances of minor adverse events. In the acupuncture group, one woman reported tiredness following treatment and one woman initially noticed an increase in urinary symptoms. There were no reports of minor adverse events in the no treatment group. However, the evidence is very uncertain about the effect of acupuncture on the number of minor adverse events (Summary of findings 1; very low-certainty evidence).

Secondary outcomes

Presence or absence of urinary urgency

Not reported.

Daytime urinary frequency

Not reported.

Episodes of urinary incontinence in a 24-hour period

Not reported.

Episodes of nocturia

Not reported.

Improvement in objective measures of urinary incontinence

Not reported.

Improvement in general quality of life

Not reported.

Acupuncture versus sham acupuncture

Five studies including a total of 279 participants compared acupuncture with sham acupuncture (Aydoğmuş 2014; Engberg 2009; Lin 2020; Yang 2016; Zhang 2015).

Primary outcomes

Number of participants whose overactive bladder symptoms were cured or improved

The evidence is very uncertain about the effect of acupuncture on curing or improving overactive bladder symptoms compared to sham acupuncture within 12 weeks of commencing treatment (standardised mean difference (SMD) -0.36, 95% confidence interval (CI) -1.03 to 0.31; 3 studies; 151 participants; I^2 = 65%; Analysis 2.1; Summary of findings 2; very low-certainty evidence).

Number of major adverse events

All five studies reported that there were no major adverse events.

Number of minor adverse events

Of the five studies included, two studies reported that there were no minor adverse events in the acupuncture or sham groups (Aydoğmuş 2014; Yang 2016). Three studies recorded the number of participants who had at least one minor adverse event from either the acupuncture or sham acupuncture group (Engberg 2009; Lin 2020; Zhang 2015). The data from Engberg 2009 could not be included in the meta-analysis as the absolute numbers of participants who had at least one minor adverse event were not reported; instead, the team reported the percentage of participants who reported each particular complaint. Therefore, we included data from four studies in the meta-analysis.

There is probably no evidence of a difference in the number of minor adverse events with acupuncture compared with sham acupuncture within eight weeks of treatment (risk ratio (RR) 1.28, 95% CI 0.30 to 5.36; 4 studies; 222 participants; I^2 = 0%; Analysis 2.2; Summary of findings 2; moderate-certainty evidence). The types of minor adverse events reported in the studies are recorded in Table 2.

Secondary outcomes

Presence or absence of urinary urgency

One study reported on the presence or absence of urinary urgency with data taken from bladder diaries and reported as episodes per day following eight weeks of treatment (Yang 2016). The evidence is very uncertain about the effect of acupuncture on the presence or absence of urinary urgency compared to sham acupuncture (mean difference (MD) -4.52, 95% CI -11.33 to 2.29; 1 study; 25 participants; Analysis 2.3; Summary of findings 2; very low-certainty

evidence). The lower CI is implausible given the nature of the outcome in question.

Daytime urinary frequency

Two studies reported on frequency of micturition (Aydoğmuş 2014; Yang 2016). The evidence is very uncertain about the effect of acupuncture on daytime urinary frequency within eight weeks of treatment (2 studies; 77 participants; Summary of findings 2; very low-certainty evidence). Yang 2016 reported mean number of voids in a 24-hour period. The acupuncture group had a mean number of voids of 11.58 compared to mean number of voids in the sham acupuncture group of 13.62. Aydoğmuş 2014 compared the time between voids. Following acupuncture, 11 of 28 participants could delay voiding for more than two hours. Following sham acupuncture, 0 of 24 participants could delay voiding for more than two hours.

Episodes of urinary incontinence in a 24-hour period

Two studies reported on episodes of incontinence (Lin 2020; Yang 2016). Acupuncture probably results in little to no difference in episodes of urinary incontinence in a 24-hour period compared with sham acupuncture following eight weeks of treatment (MD 0.55, 95% CI -1.51 to 2.60; I^2 = 57%; 2 studies; 121 participants; Analysis 2.4; Summary of findings 2; moderate-certainty evidence).

Episodes of nocturia

One study reported on episodes of nocturia (Yang 2016). The evidence is very uncertain about the effect of acupuncture on episodes of nocturia compared with sham acupuncture following eight weeks of treatment (MD -2.52, 95% CI -4.80 to -0.24; 1 study; 25 participants; Analysis 2.5; Summary of findings 2; very low-certainty evidence). The lower CI is implausible given the nature of the outcome in question.

Improvement in objective measures of urinary incontinence

Zhang 2015 reported on urodynamic testing parameters following six weeks of treatment, including:

- 1st sensation of filling in millilitres (MD 17.20, 95% CI 4.66 to 29.74; 1 study; 45 participants; Analysis 2.6);
- volume at first urge in millilitres (MD -10.00, 95% CI -28.57 to 8.57; 1 study; 45 participants; Analysis 2.7);
- maximum cystometric capacity in millilitres (MD 53.80, 95% CI 26.68 to 80.92; 1 study; 45 participants; Analysis 2.8);
- QMax in millilitres (MD -1.40, 95% CI -3.65 to 0.85; 1 study; 45 participants; Analysis 2.9); and
- post void residual in millilitres (MD 0.90, 95% CI -2.81 to 4.61; 1 study; 45 participants; Analysis 2.10).

The reported difference between the acupuncture and sham acupuncture groups is extremely small and is unlikely to result in a functional difference.

Improvement in general quality of life

Zhang 2015 reported a general quality of life measure, using the Kings Fund Questionnaire. It is scored from 0 (best) to 900 (worst) and a lower score indicates a better quality of life. Although the results suggest an improvement in quality of life in the acupuncture group compared to the sham acupuncture group after six weeks

of treatment (MD -260.00, 95% CI -314.60 to -205.40; 1 study; 45 participants; Analysis 2.11), the number of participants was small and the follow-up period was short, leading to a low certainty of evidence.

Acupuncture versus conservative treatments

Two studies including a total of 522 participants compared acupuncture to conservative treatments (Liu 2019; Solberg 2016). Liu 2019 compared acupuncture with both medication and pelvic floor muscle training, while Solberg 2016 compared acupuncture with pelvic floor muscle training alone.

Primary outcomes

Number of participants whose overactive bladder symptoms were cured or improved

The results from the two studies could not be pooled as although they both used the same outcome measure, the ICIQ-SF, they chose to report differently.

Liu 2019 used the ICIQ-SF to measure change in urinary symptoms and reported the outcomes as change scores with adjusted mean (95% CIs) following 12 weeks of treatment. The acupuncture group were reported as 3.96 (95% CI -3.61 to 4.32), while the solifenacin and pelvic floor muscle training group were reported as 3.73 (95% CI -3.37 to 4.09).

Solberg 2016 used the ICIQ-SF to assess change in urinary symptoms and reported as change scores with median and interquartile range (IQR). The acupuncture group had a median of 6.5 (IQR 4) following 12 weeks of treatment, while the pelvic floor muscle training group had a median of 5 (IQR 5.3).

Number of major adverse events

Both studies reported that there were no major adverse events.

Number of minor adverse events

Two studies reported that there may be a reduction in minor adverse events with acupuncture compared to conservative treatments following 12 weeks of treatment (RR 0.33, 95% CI 0.26 to 4.1; 519 participants; I^2 = 52%; Analysis 3.1).

Secondary outcomes

Presence or absence of urinary urgency

Liu 2019 reported the change in urgency episodes over a 72-hour period with bladder diary data using adjusted mean and 95% CIs. In both groups the episodes of urgency reduced following the intervention following 12 weeks of treatment (acupuncture group 2.62, 95% CI -2.05 to 3.2; solifenacin/pelvic floor muscle training group 2.99, 95% CI -2.41 to 3.85).

Daytime urinary frequency

Liu 2019 reported the change in micturition episodes over a 72-hour period using bladder diary data. The study reported using adjusted mean episodes and 95% CIs. In both groups the episodes of frequency reduced following 12 weeks of treatment (acupuncture group 3.23, 95% CI -2.53 to 3.93; solifenacin/pelvic floor muscle training group 3.62, 95% CI -2.91 to 4.33).

Episodes of urinary incontinence in a 24-hour period

Liu 2019 reported the change in episodes of incontinence over a 72-hour period using bladder diary data. The study reported using adjusted mean and 95% CIs and percentage change. In both groups the episodes of incontinence reduced following 12 weeks of treatment (acupuncture group 7.38, 95% CI -6.53 to 8.23, -37.83%; solifenacin/pelvic floor muscle training group 7.51 95% CI 6.61 to 8.42, -36.49%).

Episodes of nocturia

Liu 2019 reported the change in episodes of nocturia over a 72-hour period using bladder diary data. The study reported using adjusted mean number of episodes and 95% CIs. In both groups the episodes of nocturia reduced following 12 weeks of treatment (acupuncture group 0.79, 95% CI -0.5 to 1.01; solifenacin/pelvic floor muscle training group 0.87, 95% CI -0.65 to 1.09).

Improvement in objective measures of urinary incontinence

Not reported.

Improvement in general quality of life

Not reported.

Acupuncture versus medication

A total of 11 studies including a total of 1192 participants compared acupuncture with medication for overactive bladder. Four studies used solifenacin (Aydoğmuş 2014; Liu 2019; Wang 2013a; Yang 2016), six studies used tolterodine (Hong 2015; Chen 2009; Shen 2020; Wang 2011; Yu 2012; Yuan 2015), and one study used oxybutynin (Kelleher 1994).

Primary outcomes

Number of participants whose overactive bladder symptoms were cured or improved

Five studies reported cure or improvement rates using participant subjective opinion scales (total effective rates). Acupuncture may result in a slight increase in cure or improvement of overactive bladder symptoms compared with medication within four weeks of treatment (RR 1.25, 95% CI 1.10 to 1.43; 5 studies; 258 participants; I² = 19%; Analysis 4.1; Summary of findings 3; low-certainty evidence).

Number of major adverse events

All studies reported that there were no major adverse events.

Number of minor adverse events

Eight studies reported minor adverse events (Aydoğmuş 2014; Hong 2015; Kelleher 1994; Liu 2019; Shen 2020; Wang 2011; Yang 2016; Yuan 2015). Acupuncture may reduce the number of minor adverse events compared to medication within 12 weeks of treatment (RR 0.34, 95% CI 0.26 to 0.45; 8 studies; 1004 participants; I² = 51%; Analysis 4.2; Summary of findings 3; low-certainty evidence). The details of the types of minor adverse events are summarised in Table 2.

Secondary outcomes

Presence or absence of urinary urgency

Two studies addressed this outcome (Wang 2013a; Yang 2016). The evidence is uncertain about the effect of acupuncture on the

presence or absence of urinary urgency following four weeks of treatment (MD -0.40, 95% CI -0.56 to -0.24; 2 studies; 80 participants; I² = 0%; Analysis 4.3; Summary of findings 3; very low-certainty evidence).

Daytime urinary frequency

Four studies reported on this outcome, assessing voids per day from bladder diary data (Wang 2011; Wang 2013a; Yang 2016; Yuan 2015). Acupuncture may result in little to no difference in urinary frequency compared to medication for overactive bladder symptoms following four weeks of treatment (MD 0.73, 95% CI -0.39 to 1.85; 4 studies; 360 participants; I² = 28%; Analysis 4.4; Summary of findings 3; low-certainty evidence).

Episodes of urinary incontinence in a 24-hour period

One study reported on this outcome, assessing episodes per 24 hours from bladder diary data (Yang 2016). The evidence is very uncertain about the effect of acupuncture on episodes of incontinence in a 24-hour period when compared to medication following eight weeks of treatment (MD -0.33, 95% CI -2.75 to 2.09; 1 study; 20 participants; Analysis 4.5; Summary of findings 3; very low-certainty evidence).

Episodes of nocturia

Two studies reported on this outcome, assessing episodes per night from bladder diary data (Wang 2013a; Yang 2016). Acupuncture may slightly reduce the number of episodes of nocturia compared with medication following four weeks of treatment (MD -0.50, 95% CI -0.65 to -0.36; 2 studies; 80 participants; I² = 0%; Analysis 4.6; Summary of findings 3; low-certainty evidence).

Improvement in objective measures of urinary incontinence

Volume of urine voided in millilitres was reported by one study (Wang 2013a) (MD -4.00, 95% CI -20.71 to 12.71; 1 study; 60 participants; Analysis 4.7). There is a very small difference between the acupuncture and medication groups that is unlikely result in a functional difference.

Improvement in general quality of life

Not reported.

DISCUSSION

Acupuncture has been suggested as an alternative treatment modality for overactive bladder. We discovered a wide variety of acupuncture techniques, treatment regimens, comparators used, lengths of follow-up, outcomes used for measuring efficacy and ways in which outcome data were reported. This led to difficulty in pooling the data to answer the question of whether acupuncture is an effective treatment for overactive bladder in adults.

Summary of main results

This review had three primary outcomes of interest.

Cure or improvement of overactive bladder symptoms

Only one study compared acupuncture to no treatment (Solberg 2016). The main focus of this study was feasibility and the number of participants was very small (n = 24). Improvement was measured by applying the International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF). The minimal

clinically important difference for the ICIQ-SF is 4 points (Lim 2019); only the acupuncture group achieved this level of reduction, reducing the median ICIQ-SF from 13 at baseline to 6.5 after 12 weeks of intervention. Acupuncture may improve symptoms of overactive bladder compared to no treatment but the evidence is very uncertain, as we only have one feasibility study to draw upon (Summary of findings 1).

Five studies addressed the comparison of acupuncture with sham acupuncture (Aydoğmuş 2014; Engberg 2009; Lin 2020; Yang 2016; Zhang 2015). The type, application and duration of acupuncture, and outcomes chosen, all varied considerably between studies, making pooling data difficult. The meta-analysis suggests that acupuncture results in little to no difference in cure or improvement in overactive bladder symptoms when compared to sham acupuncture but the evidence is very low-certainty due to risk of bias in study design, inconsistency between studies and small participant numbers (Summary of findings 2).

Eleven studies compared acupuncture with medications for symptoms of overactive bladder (Aydoğmuş 2014; Chen 2009; Hong 2015; Kelleher 1994; Liu 2019; Shen 2020; Wang 2011; Wang 2013a; Yang 2016; Yu 2012; Yuan 2015). Acupuncture may result in a slight increase in cure or improvement in overactive bladder symptoms compared to medication but the certainty of evidence is low due to risk of bias in study design, in particular the lack of participant blinding to intervention group and imprecision due to small participant numbers (Summary of findings 3). Three studies in this comparison combined medication with an additional conservative treatment, pelvic floor muscle training or bladder retraining (Hong 2015; Liu 2019; Yu 2012). Whilst these designs reflect how clinical care is delivered in a 'real world' situation, it is impossible to define which of the treatments used was responsible for the effects observed. This therefore makes interpretation of the results difficult.

Number of major adverse events

There were 1395 participants in the included studies and no reports of major adverse events (Summary of findings 1; Summary of findings 2; Summary of findings 3). However, major adverse events are a rare occurrence in acupuncture treatment (MacPherson 2001), so the number of participants included in this review is likely too small to detect such an occurrence.

Number of minor adverse events

Twelve studies included information with regard to minor adverse events (Aydoğmuş 2014; Engberg 2009; Hong 2015; Kelleher 1994; Lin 2020; Liu 2019; Shen 2020; Solberg 2016; Wang 2011; Yang 2016; Yuan 2015; Zhang 2015). The reported types of minor adverse event included pain on needle insertion and bleeding on needle removal for acupuncture groups, allergy to adhesive tape in the sham acupuncture groups and dry mouth in the medication groups. There is moderate-certainty evidence that acupuncture probably leads to a slight increase in the number of minor adverse events compared to sham acupuncture (Summary of findings 2). However, small numbers of participants leads to caution regarding these findings. In comparison, acupuncture may lead to fewer minor adverse events when compared to medication for overactive bladder; however, the evidence is of low certainty due to high heterogeneity between studies and wide confidence intervals (Summary of findings 3).

Overall completeness and applicability of evidence

Each outcome selected for this review was measured in at least one study. The included studies related to the population stipulated in the review question and the interventions and comparators of interest were all present in at least one included study. The search strategy used was extensive and covered studies published in English and Chinese. We used Google Translate to identify whether two studies found (one in German and one in Spanish) fitted the criteria for inclusion; both were excluded.

The number of studies identified in the searches demonstrates the level of interest in this subject. However, only 15 studies were finally included in the review, indicating that there is considerable variation in the way research is being conducted. There was a lack of consistency in:

- how a diagnosis of overactive bladder was defined;
- study design;
- outcome measures used;
- application of acupuncture in terms of point selection, type and depth of insertion, use of electrical or manual stimulation, length of treatment and frequency of treatment;
- follow-up assessment; and
- assessment of longevity of effect.

Sample sizes in the majority of studies were lower than 50 and the total number of participants included was 1395. The current evidence does not address differences that may be observed between subgroups of people with overactive bladder, i.e. men and women, pre and post menopausal women, or populations grouped by age. There is a lack of evidence regarding the rationale underpinning the acupuncture approach, for example the traditional Chinese medicine approach versus a western acupuncture approach.

There is also debate regarding sham acupuncture procedures (Deng 2015). This relates to whether any stimulation applied at a known acupuncture point may exert a physiological effect. This may in part explain the lack of difference in effect between acupuncture and sham acupuncture applications.

Most studies were conducted over a short time period with few having follow-up periods of any length. Therefore, the long-term effects of acupuncture treatment on overactive bladder symptoms is yet to be established.

The review team conclude that the current literature does not fully answer all the outstanding questions regarding the role of acupuncture in the treatment of overactive bladder and its applicability in healthcare services

Quality of the evidence

GRADE assessment of the evidence resulted in low- or very low-certainty evidence for the majority of outcomes. We downgraded the evidence largely due to risk of bias in study designs, as well as imprecision due to the small numbers of participants included in studies and wide confidence intervals. Most included studies had small numbers of participants and there was heterogeneity in design, comparators, type of intervention, length of intervention and length of follow-up. All these factors reduced our ability to pool data, with some analyses performed only containing one small

study and giving implausible confidence intervals given the type of outcome being considered.

A further contribution to the downgrading of evidence was the inadequate blinding of participants, which is difficult to achieve in acupuncture protocols and resulted in many studies being judged at high risk of performance bias. Sham acupuncture procedures exist but there are arguments regarding their efficacy (Deng 2015), while the preservation of blinding needs to be assessed as part of the study procedures. The majority of included studies either did not use a sham procedure or did not provide sufficient evidence of the preservation of blinding. Only one study provided both (Lin 2020).

Potential biases in the review process

We undertook extensive searching of both English and Chinese language databases during this review to minimise the risk of missing relevant studies due to language barriers. We used two teams of review authors and divided the work into reports available in English and those only available in Chinese. Both review teams used Covidence software to complete risk of bias assessments and extract data and consensus was agreed without the need for arbitration by a third review author. These steps involve subjective assessment and may carry some risk of bias. During the production of the review report there was constant communication between review authors to ensure that the Chinese studies were accurately reported and presented.

Agreements and disagreements with other studies or reviews

A systematic review was conducted in 2018 addressing the efficacy and safety of using acupuncture to treatment symptoms of overactive bladder in adults (Zhao 2018). This review included trials using acupuncture combined with other treatments, as well as acupuncture as a standalone intervention. Therefore, the focus of our review differs from this review. All studies included in this review have acupuncture as a standalone arm in the study design. Zhao 2018 concluded that acupuncture may reduce episodes of urinary frequency, urge incontinence and nocturia but the conclusions of the review were limited by the quality of the evidence, small sample sizes and heterogeneity in study designs. Our review agrees with the limitations expressed by Zhao 2018. The diversity of comparisons used, outcomes measured and methods of reporting have limited the conclusions that can be drawn from the evidence we collected.

Brief economic commentary

To supplement the main review of the use of acupuncture for treating overactive bladder in adults, we sought to identify relevant economic evaluations as part of the review. No economic studies were identified that analysed the use of acupuncture in adults with overactive bladder. The apparent shortage of relevant economic evaluations indicates that there is a paucity of economic evidence as to the efficiency of acupuncture for treating overactive bladder in adults.

AUTHORS' CONCLUSIONS

Implications for practice

The question of whether acupuncture is an effective treatment for overactive bladder symptoms remains unresolved. Care providers and patients may wish to consider the use of acupuncture to treat overactive bladder symptoms where other treatment modalities are unsuccessful, carry a significant risk of side effects or are considered undesirable by the patient.

If used, patients should be made aware that the mechanisms underlying the effects of acupuncture remain poorly understood and that, as with other treatments, it does not produce a significant reduction in symptoms in all patients.

Implications for research

Further sufficiently powered, well-designed studies are required to answer the question posed by this review. Areas for consideration in future studies should include:

- a core outcome set for overactive bladder treatment studies derived from stakeholder engagement;
- acupuncture regimens to include a standardised point selection, application, treatment length, with or without stimulation, and follow-up length; and
- the use of a sham arm should be considered to assess the possible mechanisms that may underpin the physiological effects of acupuncture.

Adoption to the STRICTA guidelines (reporting standards for acupuncture studies) is also recommended (MacPherson 2010).

The use of combined treatments in future studies should be regarded with caution. While the use of combined treatments in both intervention and comparator arms may reflect 'real world' clinical treatments, it poses difficulties when analysing the results of trials (i.e. it is not possible to know which of the treatments is responsible for the observed effects). Consideration of whether or not acupuncture is a cost-effective treatment for a long-term condition should be addressed.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Aydoğmuş 2014

Study characteristics		
Methods	**Study design:** RCT	
	Study grouping: parallel-group	
Participants	**Country:** Turkey	

Aydoğmuş 2014 *(Continued)*

Setting: Urology Department Ankara Training Hospital

Number of participants: 90

Sex: women

Mean age (SD): 38 (12.9)

Mean parity: 2.25

Inclusion criteria: OAB symptoms in line with ICS criteria; diagnosis confirmed using the International Consultation on Incontinence-Short Form (Turkish) (ICIQ-SF-T)

Exclusion criteria: previous urogenital surgery; pelvic radiotherapy; chronic neurological or endocrine disease; cystocele; stress incontinence; urinary tract infection; medication impacting on urinary symptoms

Interventions	**Group I (n = 30):** solifenacin 5 mg once per day for 4 weeks
	Group II (n = 30): acupuncture; 25 mm needles were inserted at LI4, SP 6, ST 36, LIV3, KI3, KI5 bilaterally and at CV4, DU22 and Ying Tang as single needles. DeQi was achieved then needles were left unstimulated for 20 mins. Twice a week for 8 sessions, 20 minutes duration.
	Group III (n = 30): sham acupuncture. Points used as per acupuncture group but with non-penetrating needles. Frequency as per acupuncture group.

Outcomes	Outcomes were collected at baseline and following 4 weeks of treatment

Primary outcomes

- Nerve growth factor levels in urine
- ICIQ-SF-T scores
- Quality of life score (measures used were not reported)
- Frequency of voiding

Secondary outcomes

- Adverse events

Identification	**Sponsorship source:** none reported
	Conflicts of interest: not reported

Notes	All participants were OAB dry
	Duration: 4 weeks
	Follow-up: no
	Withdrawals/dropouts: 8
	ITT analysis: no

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Comment: Although the paper says the participants were randomly assigned, there is no detail on how this was achieved.
Allocation concealment (selection bias)	Unclear risk	No mention of allocation concealment in the study report.

Aydoğmuş 2014 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	High risk	There was not uniform blinding of participants in the study. The medication arm was not blinded, whereas the acupuncture and sham acupuncture arms may or may not have been aware of the treatment they were receiving.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There was no discussion in the paper regarding the blinding of assessors to participant group allocation when measuring outcomes.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Exclusions were reported (9% attrition rate) but the reasons were not discussed. Their data were omitted from the final analysis.
Selective reporting (reporting bias)	Unclear risk	All the outcomes stated as of interest are reported in the results but there is no detail around the tools used to assess quality of life and there is no description of the ICIQ SF-T in terms of how the tool is scored and if it varies from the English version.
Other bias	Unclear risk	Baseline characteristics reported for the whole group and stated no significant difference between groups but no detail on how this conclusion was drawn.

Chen 2009

Study characteristics	
Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** China
	Setting: Second Affiliated Hospital of Heilongjiang University of Chinese Medicine
	Number of participants: 48
	Sex: men
	Age range: 51 (26 to 76)
	Inclusion criteria: diagnosed with overactive bladder from urology and outpatient clinics, who have urinary urgency, urinary incontinence or frequency
	Exclusion criteria: endocrine and neurological diseases
Interventions	**Group I (n = 24):** electro-acupuncture. BL32, BL35, CV1, CV2. Sterile needles, vertical insertion, needles rotated until DeQi achieved then left in place with disperse-dense wave (electronic stimulation) for 30 minutes. Once per day for 2 weeks.
	Group II (n = 48): medication; oral tolterodine 2 mg twice a day for 2 weeks
Outcomes	Total effective rate assessed at the end of treatment in all cases
Identification	**Sponsorship source:** no sources identified
	Conflicts of interest: no declared conflicts of interest
Notes	**Duration**: 2 weeks
	Follow-up: no

Chen 2009 *(Continued)*

Withdrawals/dropouts: none reported

ITT analysis: no

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	There was no description of sequence generation except "randomly grouped".
Allocation concealment (selection bias)	Unclear risk	Only mentions "random" without concealment methods.
Blinding of participants and personnel (performance bias) All outcomes	High risk	There was no description of blinding of participants and personnel, but we infer that participants and personnel were not blinded.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not mentioned in report. We were unable to assess if outcome assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	The number of participants recruited and the number whose outcomes were reported were the same.
Selective reporting (reporting bias)	Low risk	There is only one outcome and it is fully reported.
Other bias	Low risk	No other sources of bias detected.

Engberg 2009

Study characteristics

Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** USA
	Setting: university
	Number of participants: 11
	Sex: women
	Mean age (SD): 54.9 (8) years
	Mean years of formal education (SD): 16.1 (3.1)
	Inclusion criteria: women who had a least 2 episodes of incontinence and documented urge or mixed incontinence symptoms in their 7-day bladder diary
	Exclusion criteria: post void residual of 200 mL or more; grade 2 pelvic organ prolapse; previous experience of acupuncture for any condition; unable or unwilling to complete a bladder diary; treatment with loop diuretics, corticosteroids or warfarin; pregnancy

Engberg 2009 *(Continued)*

Interventions	**Group I (n = 5):** acupuncture. Points used: Bl 23, 31, 32, 33, Ki 3, Sp 6. DeQi achieved. 12 sessions over 6 weeks (twice per week).
	Group II (n = 6): sham acupuncture. Blunted needles with telescopic retraction, performed over acupuncture points as per treatment group. Needles were secured in place with a basal ring and double sided tape. 12 sessions over 6 weeks (twice per week).
Outcomes	Outcomes were measured at baseline, at 6 weeks when treatment was completed and at 4 weeks following cessation of treatment • 7-day bladder diary • SF-36: physical component and mental health components • IIQ • UDI urge symptoms
Identification	**Sponsorship source:** Ruth Perkins Kuehn award **Conflicts of interest:** not reported
Notes	**Duration**: 10 weeks **Follow-up**: yes **Withdrawals/dropouts:** 2 **ITT analysis:** no **OAB diagnosis:** to be eligible for this study women had to report urge incontinence at least twice per week for more than 3 months thereby fulfilling the criteria for a diagnosis of OAB

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Simple computer-generated randomisation used.
Allocation concealment (selection bias)	Unclear risk	No discussion of methods to prevent research staff from knowing or predicting the allocation to an intervention group.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	In this small population the blinding using sham needles appears to have been successful.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Text stated that investigators were blinded to intervention group.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Reported dropouts and reasons why.
Selective reporting (reporting bias)	High risk	Multiple questionnaires used but not all reported.
Other bias	Low risk	No other sources of bias detected.

Hong 2015

Study characteristics

Methods	**Study design:** quasi-RCT
	Study grouping: parallel-group
Participants	**Country:** China
	Setting: Handan People's Hospital Internal and Neurology Medicine Clinic
	Number of participants: 66
	Sex: not reported
	Mean age (SD): 56.91 years (12.85)
	Course of disease (SD): 7.78 years (5.66)
	Inclusion criteria: meet the diagnostic criteria of mixed urinary incontinence; can co-operate with relevant examinations and treatments; no contraindications for electro-acupuncture treatment; sign informed consent and voluntarily participate in the research
	Exclusion criteria: participants who did not meet the diagnostic criteria of MUI; history of previous surgical treatment of urinary incontinence or pelvic floor surgery; symptomatic urinary tract infection; patients who were taking medicines affect the function of bladder; pregnancy or lactation; severe heart, brain, kidney and other system; mental illness; those who cannot co-operate with treatment
Interventions	**Group I (n = 32):** electro-acupuncture. CV 3, CV4, SP 6, ST 36, LR 10. Sterile needles, vertical insertion to 2.5 to 4.0 cm depth in LR10, ST36, SP 6; oblique insertion 4 to 5 cm in CV3, CV 4. Needles rotated clockwise until DeQi achieved; electronic stimulation with 20 to 30 Hz in ST36, SP 6. Five times a week per week for 4 weeks, 30 mins each time.
	Group II (n = 33): medication; oral tolterodine 2 mg twice a day for 4 weeks plus bladder training
Outcomes	Outcomes were measured at baseline and after 4 weeks of treatment
	• Leakage volume within 1 hour before and after treatment • CIQ-SF score • Total effective rate
Identification	**Sponsorship source:** Handan Science and Technology Research and Development Plan Project, No.: 1323108090-3
	Conflicts of interest: not reported
Notes	**Duration:** 4 weeks
	Follow-up: no
	Withdrawals/dropouts: 1
	ITT analysis: no
	OAB diagnosis: participants had a diagnosis of OAB that conformed to the ICS definition

Risk of bias

Bias	Authors' judgement	Support for judgement

Random sequence genera-tion (selection bias)	High risk	Quote: "with random number table, randomly divided participants according to admission sequence."
Allocation concealment (selection bias)	High risk	There was no description of allocation concealment except "quasi-random".
Blinding of participants and personnel (perfor-mance bias) All outcomes	High risk	No blinding and the outcome is likely to be influenced by lack of blinding.
Blinding of outcome as-sessment (detection bias) All outcomes	High risk	No blinding and the outcome measurement is likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Clear reasons given for missing outcome data.
Selective reporting (re-porting bias)	Low risk	The study protocol is not available but it is clear that the published report in-cluded all expected outcomes.
Other bias	Low risk	No other sources of bias detected.

Kelleher 1994

Study characteristics

Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** UK
	Setting: outpatient hospital clinics
	Number of participants: 39
	Sex: women
	Mean age: 49.65 years
	Mean duration of symptoms: 5.05 years
	Inclusion criteria: irritative bladder symptoms; negative mid-stream culture
	Exclusion criteria: known to have non-neurogenic pathology likely to impair bladder compliance (e.g. previous radiotherapy or large fibroid uterus)
Interventions	**Group I (n = 20):** acupuncture. Performed by an experienced acupuncturist, using 36 gauge, 3 cm long, disposable needles and a minimal stimulation technique i.e. the needles were merely flicked into the skin through an introducer. Fifteen needles were used at each visit and needles were left in situ a few mm below the skin without further stimulation for 10 minutes. The acupuncture points used were bi-lateral Spleen 6 (SP6), Stomach 36 (ST36), Conception Vessel 3 or 4 (CV3 or 4), Bladder 23 and 28 (BL23 & 28). Two further para-vertebral, lumbar, segmental points and 4 sacral, segmental points were em-ployed. These were specifically chosen for possible autonomic effect. 10 minutes per session, 6 ses-sions, once per week

Kelleher 1994 *(Continued)*

Group II (n = 19): medication; oxybutynin (Ditropan) at a dose of 5 mg. Twice a day for 6 weeks and once weekly visit to hospital department.

Outcomes	Applied at baseline and after 6 weeks of treatment • Urinary symptoms measured by VAS • Urinary symptoms measured by bladder diary data • Bladder function tested by urodynamic parameters
Identification	**Sponsorship source:** none specified **Conflicts of interest:** not reported
Notes	**Duration:** 6 weeks **Follow-up:** no **Withdrawals/dropouts:** 4 **ITT analysis:** no **OAB diagnosis:** this study refers to irritative bladder symptoms rather than OAB but describes these symptoms as including "urgency, urge incontinence, frequency and nocturia" thereby fulfilling the diagnosis of OAB required for inclusion in this review

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Random number table used; method not detailed.
Allocation concealment (selection bias)	Unclear risk	No mention in paper of steps taken to prevent research staff from being able to predict the sequence of allocation.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and research staff were not blinded to intervention group.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	It appears that assessments were not carried out by the allocation or intervention staff but there is no explicit referral to blinding of the assessors. Unclear if "another doctor" (p.10) was aware of group allocation.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Dropouts and reasons for dropouts recorded.
Selective reporting (reporting bias)	Low risk	No evidence of non-reporting but no published protocol pre-study.
Other bias	Low risk	No other sources of bias detected

Lin 2020

Study characteristics

Lin 2020 *(Continued)*

Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** Hong Kong, China
	Setting: The Chinese University of Hong Kong Chinese Medicine Centre for Training and Research
	Number of participants: 100
	Sex: men (n = 45) and women (n = 55)
	Mean age (SD): 68.45 (6.2) years
	Inclusion criteria: aged between 60 to 90 years old; diagnosed as OAB according to the diagnosis criteria of the ICS; physically and mentally able to complete the 3-day voiding diary, Urinary Distress Inventory (UDI-6) and Incontinence Impact Questionnaire (IIQ-7); able to give written informed consent (by patients themselves or by their caretakers)
	Exclusion criteria: OAB symptom caused by stroke or spinal injury; life-threatening infection; unconsciousness or severe cognitive deficits; dementia caused by Alzheimer's disease or other neurodegenerative diseases; undergone incontinence surgery previously; taking short-term active diuretic treatment or taking diuretic medication; had received acupuncture treatment for OAB within 2 months prior to the study; pregnancy; suffering from untreated urinary tract infection, urogenital tumours, prostate tumour, benign prostatic hyperplasia, chronic urinary retention
Interventions	**Group I (n = 51):** acupuncture. Based on the traditional acupuncture theory, previous relevant studies, and opinion of acupuncture experts of the research team, the following acupuncture points were selected for treatment: BL32 (Ciliao, 次髎) (bilateral), BL23 (Shenshu, 腎俞) (bilateral), SP6 (Sanyinjiao, 三陰交) (bilateral), KI3 (Taixi, 太溪) (bilateral), BL39 (Weiyang, 委陽) (bilateral), BL28 (Pangguangshu, 膀胱俞) (bilateral) and CV4 (Guanyuan, 關元) . 30-minute acupuncture sessions, twice a week for 8 weeks.
	Group II (n = 49): sham acupuncture. Sham needles with retractable shafts were used on the same points described for the true acupuncture group. The needle tips were blunted to prevent skin penetration. Needles were secured to the skin using adhesive tape. 30-minute acupuncture sessions, twice a week for 8 weeks.
Outcomes	Outcomes were applied at baseline, after 8 weeks of treatment and 3 months following completion of treatment
	• Frequency of urinary urge
	• Incontinence over a 3-day period
	• Incontinence Impact Questionnaire (IIQ-7)
	• Overactive Bladder Symptom Score (OABSS)
	• Urogenital Distress Index (UDI-6)
	• Adverse events
Identification	**Funding source:** supported by the Health and Medical Research Fund of the Food and Health Bureau, Hong Kong Special Administrative Region Government (Project no. 13141941)
	Conflicts of interest: the authors stated there were no conflicts of interest
Notes	**Duration:** 20 weeks
	Follow-up: 12 weeks after 8-week intervention
	Withdrawals/dropouts: 4
	ITT analysis: yes

Lin 2020 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Remote sequence generation; block randomisation by someone not involved in patient care.
Allocation concealment (selection bias)	Low risk	Allocation concealment safeguarded.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Measured using the Blinding Index and found to have attained effective blinding.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Blinding of the outcome assessors confirmed in study report.
Incomplete outcome data (attrition bias) All outcomes	Low risk	All dropouts and reasons for dropouts were included. ITT analysis performed.
Selective reporting (reporting bias)	Low risk	Authors acknowledged in results the NGF measurements were not successfully extracted. NGF not reported in methods sections, but explanation for exclusion provided in results.
Other bias	Low risk	No other sources of bias detected.

Liu 2019

Study characteristics	
Methods	**Study design:** RCT **Study grouping:** parallel-group
Participants	**Country:** China **Setting:** 10 sites **Number of participants:** 500 **Sex:** women **Mean age (SD):** 54.2 (9.75) years **Mean disease duration:** 3.85 (5.2) years **Inclusion criteria:** 35 to 75 years of age with mixed urinary incontinence for at least 3 months; positive cough stress test results; presented with moderate to severe symptoms according to the Urinary Incontinence Severity Index (3 points); a 72-hour IEF (incontinence episode frequency) of at least 2 at baseline **Exclusion criteria:** pure stress, urgency or other types of urinary incontinence; pelvic organ prolapse of at least second degree; post-void residual urinary volume greater than 30 mL; maximum urinary flow rate less than 20 mL/s; history of pelvic floor surgery

Liu 2019 *(Continued)*

Interventions	**Group I (n = 249):** electro-acupuncture. Acupuncture procedures were performed by licensed acupuncturists with more than 2 years experience. Acupuncture points BL33 and BL35 on both sides were used in the electro-acupuncture group. Needles were inserted at an angle of 30 to 45 degrees and a depth of 50 to 60 mm. All the needles were stimulated by manual rotation to reach DeQi sensation. The electrodes of the electric stimulator were placed on the needle handles of bilateral acupoints with a spare-dense wave, 10/50 Hz, 0.1 to 5.0 mA. 30 minutes of electro-acupuncture treatment 3 times a week for a total of 36 treatment sessions over a 12-week period. Bladder health advice was to lose weight if body mass index was greater than 30 (calculated as the weight in kilograms divided by the height in metres squared), minimising daily fluid intake to 1.5 to 2 L, and reducing caffeine intake. **Group II (n = 248):** PFMT plus solifenacin. Physiotherapy-led classes plus home DVD; 5 mg per day. Weekly classes during weeks 1 to 12, 4 weekly class during weeks 13 to 36. Participants were also encouraged to carry out a home exercise programme from weeks 1 to 36 and were given a DVD and exercise log to assist with the completion of the programme. Bladder health advice: lose weight if body mass index was greater than 30 (calculated as the weight in kilograms divided by the height in meters squared), minimising daily fluid intake to 1.5 to 2 L, and reducing caffeine intake.
Outcomes	Outcomes measured at baseline and after 12 weeks of intervention • 72-hour incontinence episode frequency • Percentage change in incontinence episode frequency • Reduction of > 50% in 72-hour IEF from baseline • Change in 72-hour urgency episodes from baseline • Change in 72-hour urination episodes • Change in 72-hour nocturia episodes • Change in ICIF-SF score • Participants using incontinence pads • Change in 1-hour pad test • Weekly use of incontinence pads • Participant-reported satisfaction at 12 weeks • Participant-reported improvement degree at 12 weeks
Identification	**Sponsorship source:** this study was supported and funded by the programme of "the 12th Five-year" National Science and Technology Pillar Program (2012BAI24B01; 2012BAI24B02) by the Ministry of Science and Technology of the People'sRepublic of China **Conflicts of interest:** authors declared there were no conflicts of interest
Notes	**Duration:** 36 weeks **Follow-up:** yes **Withdrawals/dropouts:** 33 **ITT analysis:** no **OAB diagnosis:** women included in this study had evidence of both OAB and stress incontinence symptoms and were classified as having mixed urinary incontinence

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Participants were randomly allocated at a ratio of 1:1 to receive electro-acupuncture or PFMT+Solifenacin via a central randomisation system. The randomisation schedule was stratified by enrolment site."

Liu 2019 *(Continued)*

Allocation concealment (selection bias)	Low risk	Allocation performed by staff not involved in other study processes.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Both groups were aware of the intervention they were receiving.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "The outcome assessors, data manager, and statisticians were unaware of group allocation." Comment: independent assessor for outcomes.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Quote: "497 (249 in the electro-acupuncture group and 248 in the PFMT+Solifenacin group) received at least 1 treatment session and were included in the full analysis set." Comment: detailed notes on reasons for missing data and how calculations had taken account of these.
Selective reporting (reporting bias)	Low risk	Comment: all outcome measures were reported in the results section of the paper.
Other bias	Low risk	No other sources of bias detected.

Shen 2020

Study characteristics	
Methods	**Study design:** RCT **Study grouping:** parallel-group
Participants	**Country:** China **Setting:** Department of Urology **Number of participants**: 45 **Sex:** women **Mean age (SD):** 39 years (9.9) **Inclusion criteria:** women diagnosed as OAB; aged between 18 and 60; have not used any Chinese or Western medicine in 1 week prior to commencing the study; signed informed consent **Exclusion criteria:** urinary system infections; urinary tract obstruction; urinary calculi; neurogenic bladder; urethral dysfunction; urinary retention; myasthenia gravis; ulcerative colitis; narrow-angle glaucoma; mental disorders; allergic to tolterodine tablets; residual urine volume > 50 mL; those who are equipped with a pacemaker; allergic to metals; severely afraid of needles or fainting; pregnant or breastfeeding
Interventions	**Group I (n = 23):** electro-acupuncture. BaLiao (8 sacral foramina) and Sanyinjiao (SP6). The needles were 0.30 mm × 50 mm and 0. 30 mm × 75 mm. Density wave 50 Hz. Three times a week, 30 minutes each treatment for 4 weeks, 12 times in total. **Group II (n =22):** medication; tolterodine tablet 4 mg once per day for 4 weeks
Outcomes	Outcome measures were applied at baseline, after 2 weeks of treatment and after 4 weeks of treatment

Shen 2020 *(Continued)*

- Overactive bladder symptom score (OABSS)
- Urgent urine symptom score
- Quality of life score

Identification	**Sponsorship:** Basic Research Operating Funds of the Central Public Welfare Research Institutes, and Beijing Municipal Science and Technology Commission
	Conflicts of interest: the authors reported that there were no conflicts of interest
Notes	**Duration:** 4 weeks
	Follow-up: no
	Withdrawals/dropouts: no
	ITT analysis: no

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computerised random allocation was used.
Allocation concealment (selection bias)	Unclear risk	The exact method that was used to protect allocation concealment was not reported.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Group allocation not blinded.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There is no specific reporting of blinding outcome assessors.
Incomplete outcome data (attrition bias) All outcomes	Low risk	The dropouts were low and comparable in the two groups.
Selective reporting (reporting bias)	Low risk	All outcomes were reported.
Other bias	Low risk	No other sources of bias detected.

Solberg 2016

Study characteristics

Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** Norway
	Setting: unclear
	Number of participants: 34

Solberg 2016 *(Continued)*

Sex: women

Mean age: 66

Mean parity: 2

Inclusion criteria: 18 years of age; mixed urinary incontinence; not pregnant or planning to become pregnant during the study

Exclusion criteria: women who had given birth within 12 months before the onset of the current study; women using medication for the incontinence; women who had undergone surgery for incontinence

Interventions	**Group I (n = 12):** acupuncture. CV3, CV4, CV6, SP6, KI3, KI7 (PC6, LR3 and SP3 with related symptoms) were used with patients in a supine position, and BL 31–34, BL 23, BL 28, SP6, GV4 and GV20 (forward needling) (BL 14, 18 and 20 with symptoms) were used when the patient was in prone position. 30 minutes; 12 sessions over a 12-week period at the convenience of the participant. **Group II (n = 10):** PFMT; 45 minutes (20 minutes general exercise); 12 weekly sessions with a physiotherapist **Group III (n = 12):** no intervention. The women randomised to this group received no treatment and were asked to fill in the questionnaires after 12 weeks.
Outcomes	Outcomes were applied at baseline and following 12 weeks of treatment • International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF)
Identification	**Sponsorship source:** the Norwegian Acupuncture Association funded the open access fee **Conflicts of interest:** authors stated no conflicts of interest
Notes	**Duration:** 12 weeks **Follow-up:** no **Withdrawals/dropouts:** yes - accounted for in text of article **ITT analysis:** no **OAB diagnosis:** women included in this study had evidence of both OAB and stress incontinence symptoms and were classified as having mixed urinary incontinence

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "All women meeting the inclusion criteria were randomly assigned to the treatment groups using the SurveyMonkey tool. Four women were not Internet users. They answered the questions by phone, and results were manually entered into SurveyMonkey by the first author (MS) before randomisation." Comment: an online tool was used to perform the allocation but this tool did not allow for stratification. The authors acknowledged that the baseline characteristics demonstrated that the women in the acupuncture group had a higher median symptom score than the other two groups.
Allocation concealment (selection bias)	Low risk	As an online remote system was used to perform the randomisation, the researcher involved in the allocation of participants was less likely to be able to influence this procedure.

Solberg 2016 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	High risk	Not attempted due to obvious differences in interventions.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There is no mention in the paper regarding blinding of outcome assessors.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Excluded dropouts from analysis.
Selective reporting (reporting bias)	Low risk	All stated outcomes were reported.
Other bias	Low risk	No other sources of bias detected.

Wang 2011

Study characteristics	
Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** China
	Setting: outpatients of Traditional Chinese Medicine Academy of Jilin Province
	Number of participants: 40
	Sex: female
	Age range: 51 to 79
	Inclusion criteria: diagnosed as OAB by western medicine diagnostic criteria (Clinical Guidelines for Overactive Bladder) or traditional Chinese medicine diagnostic criteria
	Exclusion criteria: not reported
Interventions	**Group I (n = 20):** acupuncture. CV3, LR 28, LR23, CV6, CV4, SP6,BL32, CV20. Sterile needles, vertical insertion with reinforcing method. Once per day for 4 weeks, 20 mins each time.
	Group II (n = 20): medication; oral tolterodine, 2 mg twice a day for 4 weeks
Outcomes	• Urination frequency in 24 hours • Total effective rate
Identification	**Sponsorship source:** no sources identified
	Conflicts of interest: this was not mentioned in the study report
Notes	**Duration:** 4 weeks
	Follow-up: no
	Withdrawals/dropouts: none reported

Wang 2011 *(Continued)*

ITT analysis: not reported

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	There was no description of sequence generation except "randomly grouped".
Allocation concealment (selection bias)	Unclear risk	There was no description of allocation concealment except "randomly grouped".
Blinding of participants and personnel (performance bias) All outcomes	High risk	There was no description of blinding of participants and personnel but due to the nature of the interventions we infer that participants and personnel were not blinded.
Blinding of outcome assessment (detection bias) All outcomes	High risk	No blinding and the outcome measurement is likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	The outcome data were complete.
Selective reporting (reporting bias)	Low risk	Outcomes were completely reported, including adverse reactions and follow-up.
Other bias	Low risk	No other sources of bias were detected.

Wang 2013a

Study characteristics

Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** China
	Setting: university hospital - urology department
	Number of participants: 60
	Sex: women
	Age range: 35 to 60 years
	Inclusion criteria: clinical diagnosis of overactive bladder; symptoms for more than 6 months; no other treatment or drugs that affect urination have been used within 2 weeks
	Exclusion criteria: average urine output > 200 mL; frequency of urination < 8 times at day and < 2 times at night; patients with bladder outlet obstruction or stress urinary incontinence; use of anticholinergic drugs; presence of other urological symptoms - neurogenic bladder; acute and chronic urinary tract infections, tumours, kidney stones
Interventions	**Group I (n = 30):** acupuncture. Sterile needles. Participant treated in the supine and prone position, vertical insertion on CV3, CV4, ST28, LR 10, SP 9 with light stimulation and reinforcing method; inten-

Wang 2013a *(Continued)*

sive stimulation for 1 minute with reducing method on BL29, LR28, BL32, CV3. 30 minutes each time and manipulations were implemented every 10 minutes. Once per day for 4 weeks.

Group II (n = 30): medication; oral solifenacin 5 mg once a day for 4 weeks

Outcomes	Outcomes were measured at baseline and after 4 weeks of treatment • Frequency of urinary urgency in 24 hours • Nocturia • Daytime frequency • Average urine voided every time (mL) • Total effective rate
Identification	**Sponsorship source:** Scientific and Technological Research Project of Traditional Chinese Medicine and Ethnic Medicine of Guizhou Provincial Administration of Traditional Chinese Medicine (No. QZYY2011) **Conflicts of interest:** there was no mention of this in the study report
Notes	**Duration:** 4 weeks **Follow-up**: no **Withdrawals/dropouts:** none **ITT analysis:** no

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "the female patients (=60) with OAB divided into acupuncture group and Solifenacin group were randomly grouped" Comment: there was no description of sequence generation except "randomly grouped".
Allocation concealment (selection bias)	Unclear risk	There was no description of allocation concealment except "randomly grouped".
Blinding of participants and personnel (performance bias) All outcomes	High risk	There was no description of blinding of participants and personnel and we infer that participants and personnel were not blinded.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There was no description of blinding of outcome assessors.
Incomplete outcome data (attrition bias) All outcomes	Low risk	The outcome data were complete.
Selective reporting (reporting bias)	Low risk	All the outcomes mentioned were reported in the study.
Other bias	Low risk	No other sources of bias detected.

Yang 2016 *(Continued)*

Study characteristics	
Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** China
	Setting: university hospital - urology department
	Number of participants: 33
	Sex: men and women - numbers of each not reported
	Mean age (SD): 57.5 (16.3) years
	Inclusion criteria: aged 18 to 75 years old; meet the diagnostic criteria for bladder hyperactivity; urination frequency (average daily urination times ≥ 8 times); no drug treatment related to this research was performed within 2 weeks before participating in the research, and no acupuncture treatment within 1 month before the research, or participating in other clinical research; disease course of the patients who participated in this study is at least 3 months; volunteer to participate in this study, and be able to ensure that they co-operate with the treatment arrangement and complete the urination journal
	Exclusion criteria: frequent and urgent urination symptoms caused by other diseases; patients with a history of botulinum bladder or pelvic muscle treatment in the past year; patients with urinary tract infection or vaginal infection; patients currently undergoing treatment with implantable pelvic stimulators; patients who are currently applying electrical stimulation to the pelvic area, back and leg areas; patients who have a history of treatment with the ingenious device of this research and related drugs of this research within the past 4 weeks; patients who are participating in clinical research related to gynaecology, urinary system or renal function; patients with blood coagulation dysfunction or taking anticoagulants, or patients with severe liver, liver or kidney damage, or patients whose general condition is poor and unable to co-operate; those who have a pacemaker; severely afraid of needles, dizziness or metal allergy; patients during pregnancy or lactation
Interventions	**Group I (n = 12):** electro-acupuncture. Bladder 33, Bladder 35. Sterile needles with diameter of 0.3 mm and length of 9 cm. Participant treated in the prone position, skin prepared with 75% alcohol pads, oblique insertion to 6 cm depth. Needles rotated clockwise until DeQi achieved then left in place with 10 HZ, 5 mA electronic stimulation for 30 minutes. Three times a week for 8 weeks, 30 minutes each time.
	Group II (n = 13): sham acupuncture. Bladder 33, Bladder 35. Sterile blunt needles with diameter of 0.3 mm and length of 4.5 cm. Participant treated in the prone position. Stick acupuncture fixed pad on acupoints and then acupressure it with blunt needle then add electronic stimulation with 10 HZ, 5 mA. Three times a week for 8 weeks, 30 minutes each time.
	Group III (n = 8): medication; oral solifenacin, 5 mg once a day for 8 weeks
Outcomes	Outcomes measured at baseline, after 4 weeks of treatment and after 8 weeks of treatment • Urinary frequency in 24 hours • Urinary urgency in 24 hours • Episodes of urinary leakage in 24 hours • Episodes of nocturia in 24 hours
Identification	**Sponsorship source:** no sources of funding were reported
	Conflicts of interest: this was not mentioned in the study report
Notes	**Duration:** 8 weeks

Yang 2016 *(Continued)*

Follow-up: no

Withdrawals/dropouts: yes

ITT analysis: not reported

OAB diagnosis: the authors of this study refer to bladder hyperactivity rather than OAB. However, the criteria for a diagnosis of OAB, namely urgency, frequency of micturition, nocturia and urge incontinence were highlighted in the outcome measures collected (bladder diary data) so the review team felt this study did meet the criteria stated in the protocol for inclusion in the review. This study is only available in Chinese and it was felt that the difference in terms used may be a translational effect.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Centralised computer randomisation is suggested in the text but not clearly specified.
Allocation concealment (selection bias)	Unclear risk	Central allocation mentioned in text but not clearly defined.
Blinding of participants and personnel (performance bias) All outcomes	High risk	No description of how blinding was conducted but as a sham group was employed blinding is inferred. However, a medication arm was also employed, which would un-blind this group.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	The text was not clear regarding blinding of outcome assessors.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Small number of dropouts and reasons reported.
Selective reporting (reporting bias)	Low risk	All the outcomes were reported, including adverse reactions.
Other bias	Low risk	No other sources of bias detected.

Yu 2012

Study characteristics

Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** China
	Setting: Traditional Chinese Medicine Hospital
	Number of participants: 44
	Median age: 35.2
	Sex: men and women - the number of each was not reported

Yu 2012 *(Continued)*

	Inclusion criteria: patients diagnosed as having OAB using the Chinese Guidelines of Diagnosis and Treatment in Urological Diseases
	Exclusion criteria: none stated
Interventions	**Group I (n = 24):** acupuncture. Needles placed at BL23, BL28 and ST 36 bilaterally. Twice per day for 2 weeks. Bladder training: delaying urination, gradually increasing urine volume voided to over 300 mL, urination at regular times and pelvic floor exercises
	Group II (n = 20): medication; oral tolterodine 2 mg twice per day. Bladder training: delaying urination, gradually increasing urine volume voided to over 300 mL, urination at regular times and pelvic floor exercises
Outcomes	Outcome assessed following 2 weeks of treatment
	Treatment effect (participant opinion with guiding criteria)
Identification	**Sponsorship source:** none given
	Conflicts of interest: this was not documented in the study report
Notes	**Duration:** 2 weeks
	Follow-up: no
	Withdrawals/dropouts: none reported
	ITT analysis: no

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method not reported.
Allocation concealment (selection bias)	Unclear risk	Method not reported.
Blinding of participants and personnel (performance bias) All outcomes	High risk	No discussion regarding blinding of participants or assessors. Due to the nature of the two interventions it is not possible to blind participants to their group allocation using the methodology employed in this study.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Blinding of outcomes assessors not documented in the study report.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No CONSORT diagram to track recruitment, intervention and dropouts.
Selective reporting (reporting bias)	Low risk	Outcomes stated were fully reported.
Other bias	Low risk	No other sources of bias detected.

Yuan 2015

Study characteristics

Methods	**Study design:** RCT
	Study grouping: parallel-group

Participants	**Country:** China
	Setting: university hospital - urology department
	Number of participants: 240
	Sex: women
	Mean age (SD): 57.85 (11.8) years
	Inclusion criteria: aged over 18; urinary urgency and nocturia with or without urgency incontinence or frequency for at least 6 months
	Exclusion criteria: urinary tract infections; interstitial cystitis; polyuria; bladder tumour; underlying neurologic abnormalities (e.g. neuropathic bladder); taking medications for OAB or receiving acupuncture for any condition; pregnant or recently gave birth (i.e. within 6 months preceding referral); previous prolapse or incontinence surgery; not beginning sexual activities (due to ethics problems)

Interventions	**Group I (n = 118):** acupuncture. Sp6, Sp9, Ki 3 and CV4. Sterile needles 35 mm x 50 mm. The participant was treated in the supine position, skin prepared with 75% alcohol pads, vertical insertion to 1 to 1.5 cm depth. Needles rotated clockwise until DeQi achieved then left in place without further stimulation for 20 minutes. Once per week for 4 weeks.
	Group II (n = 122): medication; oral tolterodine 2 mg twice a day for 4 weeks

Outcomes	Outcomes were applied at baseline and after 4 weeks of treatment
	• Urgency episode/24 hours
	• Urinary incontinence
	• Daytime frequency
	• Nocturia
	• Volume voided (mL)

Identification	**Sponsorship source:** no sources identified
	Conflicts of interest: no declared conflicts of interest

Notes	**Duration:** 4 weeks
	Follow-up: no
	Withdrawals/dropouts: yes - reasons for missing data reported
	ITT analysis: no
	Contacted authors on 8 April 2020 regarding clarification on methodology - no reply received
	OAB diagnosis: a clear definition of OAB fitting the ICS definition was given in this study

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "A computer generated list of random numbers was used, and the allocation sequence was concealed in sequentially numbered, sealed and opaque

Yuan 2015 *(Continued)*

envelopes by a doctor who did not participate in group assignment, data collection or statistical analysis."

Comment: does not mention if the randomisation was simple or block but otherwise there is no evidence that the nurses performing the allocation could predict the sequence of allocation.

Allocation concealment (selection bias)	Low risk	Quote: "The registered nurses on duty in the urological wards, outpatient clinic randomly assigned the enrolled patients to the weekly acupuncture treatment group (intervention) or the twice daily 2 mg Tolteradine treatment group at admission or first referral, using a concealed allocation sequence. A computer-generated list of random numbers was used, and the allocation sequence was concealed in sequentially numbered, sealed and opaque envelopes by a doctor who did not participate in group assignment, data collection or statistical analysis. Envelopes were opened sequentially only after participant details had been written on the envelope." Comment: the allocation was performed by an independent person who was otherwise not involved in the trial and so unable to influence the allocation process.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "Blinding of the group assignment for the nurses and patients was not possible, but in this study, the data collection, processing and analysis were conducted by other doctors who did not participate in group assignment. What is more, the doctors who made the diagnosis of OAB and recruited the subjects did not also participate in group assignment, patients' treatments, and data analysis." Comment: participants aware of allocation, therefore risk of bias is high.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "the data collection, processing and analysis were conducted by other doctors who did not participate in group assignment. What is more, the doctors who made the diagnosis of OAB and recruited the subjects did not also participate in group assignment, patients' treatments, and data analysis."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Quote: "Ten women in the intervention group were lost of follow-up and did not complete the study because of personal reasons, such as difficulty in scheduling the treatment sessions around their work schedules. Two women discontinued intervention because of unsuccessful treatment or no significant symptom relief and switched to drug therapy. While in the control group six women were lost to follow-up because of personal reasons, and six discontinued treatment because of unsuccessful treat- ment, no significant symptom relief or moderate to severe dry mouth, three of which switched to bladder training and acupuncture treatment." Comment: Table 1 gives number for each group, which is equal to baseline. However, nothing in the text states whether dropouts were included in the final analysis.
Selective reporting (reporting bias)	High risk	Adverse events mentioned in the text but no data reported to support this.
Other bias	Low risk	No other sources of bias detected.

Zhang 2015

Study characteristics

Zhang 2015 *(Continued)*

Methods	**Study design:** RCT
	Study grouping: parallel-group
Participants	**Country:** China
	Setting: Ninth People's Hospital of Chongqing
	Number of participants: 45
	Sex: women
	Mean age (SD): 41.25 (9.3)
	Inclusion criteria: women aged 18 to 65 years; diagnosis of OAB according to the definition set out by the International Continence Society in 2002; score for urinary urgency of ≥ 2 points and total overactive bladder symptom score (OABSS) of ≥ 3 points; symptoms persisting for > 6 months; previous treatment with a first line anticholinergic drug (e.g. tolterodine, solifenacin) for 3 months that was unsuccessful; volunteered to join the study and gave signed informed consent
	Exclusion criteria: neurogenic bladder dysfunction; lower urinary tract symptoms due to urinary tract infection, urinary stone or interstitial cystitis; active sexually transmitted diseases (e.g. syphilis, gonorrhoea); serious medical condition such as congestive heart failure, arrhythmia with or without cardiac pacemaker, chronic pulmonary obstructive disease and hepatic failure; previous acupuncture treatment within the past 6 months; skin infection or fear of needles
Interventions	**Group I (n = 23):** electro-acupuncture. Electro-acupuncture (EA) was performed using 6 disposable stainless steel needles (0.3 mm diameter, 75 mm length) inserted into the bilateral Bladder (BL) 32 (Ciliao), BL33 (Zhongliao) and BL34 (Xialiao) points, as standardised by the World Health Organization. The needles were inserted into points in the medial direction at an angle of 60° horizontal and 30° sagittal with a sufficient depth (about 50 mm) to reach the sacral periosteum and a DeQi sensation was obtained, defined as a heavy and numb sensation around the point after the needle is inserted. Electrodes of the electric stimulator (Huatuo brand SDZ-II; Electro-Acu Stimulators, Suzhou Medical Supply & Equipment, Jiangsu,China) were then attached to the handle of the needles bilaterally. The electrode pairs were connected across the spine at each pair of the same points, positive electrodes were attached on the left and negative electrodes on the right. Disperse-dense waves, 4 Hz and 20 Hz electric current were used in the study. The intensity of the electric current was increased to the patient's maximum tolerance and then slightly reduced to an acceptable level. 30 sessions, 5 per week for 6 weeks, each lasting 30 minutes.
	Group II (n = 22): sham electro-acupuncture. The sham electro-acupuncture (SEA) protocol included the same number and type of needles, duration and frequency of sessions as for the EA treatment, but the treatment was delivered superficially at non-points 15 mm lateral to each corresponding points. The patients experienced a pricking sensation instead of DeQi. The points were not stimulated electrically, but the sound of the pulse generator was heard by the participants. 30 sessions, 5 per week for 6 weeks, each lasting 30 minutes.
Outcomes	Outcomes applied at baseline and after 6 weeks
	• Overactive Bladder Symptom Score (OABSS) • Kings Health Questionnaire (KHQ) score • First sensation of filling • First urge • Maximum cystometric capacity • Maximum flow rate • Post void residual
Identification	**Sponsorship source:** none recorded
	Conflicts of interest: authors stated there were no conflicts of interests

Zhang 2015 *(Continued)*

Notes	**Duration:** 6 weeks
	Follow-up: no
	Withdrawals/dropouts: yes
	ITT analysis: no

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "After enrolment the 50 women were randomised 1:1 to the EA group or the sham EA (SEA) group using a computer-generated random block design." Comment: online randomisation tool.
Allocation concealment (selection bias)	Unclear risk	Text infers that those involved with allocation were separate to these delivering intervention and different from those carrying out outcome assessments. However, there is no direct report of allocation concealment.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote: "After enrolment the 50 women were randomised 1:1to the EA group or the sham EA (SEA) group using a computer-generated random block design. Participants did not know to which group they were assigned. The study was single-blind; acupuncturists could not be blinded to the treatment assignment, but were excluded from examining and enrolling patients and from all outcome assessments" Comment: we assigned unclear risk as acupuncturists could not be blinded but this was explicitly stated in the design and these research staff did not participate in other study processes. It is unclear if the lack of blinding resulted in the two groups being treated differently.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "The study was single-blind; acupuncturists could not be blinded to the treatment assignment, but were excluded from examining and enrolling patients and from all outcome assessments" Comment: text infers that those involved in delivering the intervention were different from those assessing outcomes but does not state that the outcome assessors were blinded to intervention.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Dropouts explained, were small in number and were equal between the groups.
Selective reporting (reporting bias)	Low risk	Outcomes reported were consistent throughout the paper.
Other bias	Low risk	No other sources of bias detected.

BL 14, 18, 20: bladder 14, 18, 20 acupuncture points
BL 23, 28, 31, 32, 33, 34: bladder acupuncture points
ICIQ-SF: International Consultation on Incontinence Questionnaire - Short Form
CV3: conception vessel 3 acupuncture point
CV 4: conception vessel acupuncture point
CV 6: conception vessel 6 acupuncture point
DeQi: sensation of aching, tingling, heaviness experienced during an acupuncture treatment
DU 22: cranial acupuncture point
GV 4: governor vessel 4 acupuncture point

GV 20: governor vessel 20 acupuncture point
ICIF-SF: International Consultation on Incontinence - Short Form
ICIQ-SF-T: International Consultation on Incontinence - Short Form (Turkish)
ICS: International Continence Society
IEF: incontinence episode frequency
IIQ: Incontinence Impact Questionnaire
ITT analysis: intention-to-treat analysis
KHQ: King's Health Questionnaire
KI 3: kidney 3 acupuncture point
KI 5: kidney 5 acupuncture point
KI 17: kidney 17 acupuncture point
LI 4: large intestine 4 acupuncture point
LIV 3: liver 3 acupuncture point
LR 4: liver 4 acupuncture point
MUI: mixed urinary incontinence
NGF: nerve growth factor
OAB: overactive bladder
OABSS: Overactive Bladder Symptom Score
PC 6: pericardium 6 acupuncture point
PFMT: pelvic floor muscle training
RCT: randomised controlled trial
SD: standard deviation
SF-36: Short-Form 36
SP 3: spleen 3 acupuncture point
SP 6: spleen 6 acupuncture point
SP 9: spleen 9 acupuncture point
ST 36: stomach 36 acupuncture point
UDI: Urogenital Distress Inventory
VAS: visual analogue scale
Ying Tang: facial acupuncture point

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Anhari 2011	Study design does not meet review criteria
Cai 2017	Study design does not meet review criteria
Carmona 2013	Intervention does not meet review criteria
Chen 2003	Study design does not meet review criteria
Chen 2005a	Intervention does not meet review criteria
Chen 2005b	Patient population does not have a diagnosis of OAB
Chen 2012	Study design does not meet review criteria
Chen 2015a	Patient population does not have a diagnosis of OAB
Chen 2015b	Intervention does not meet review criteria
Chen 2015c	Study design does not meet review criteria
Cheung 2018	Intervention does meet review criteria
Dunning 2017	Patient population does not have a diagnosis of OAB

Study	Reason for exclusion
Ellis 1990	Study design does not meet review criteria
Emmons 2005	Comparator does not meet review criteria
Enberg 2006	Patient population does not have a diagnosis of OAB
Feng 2011	Study design does not meet review criteria
Feng 2014	Study design does not meet review criteria
Guo 2016	Intervention does not meet review criteria
He 2016	Patient population does not have a diagnosis of OAB
He 2018	Comparator does not meet review criteria
Hong 1996	Study design does not meet review criteria
Hu 2005	Study design does not meet review criteria
Hu 2015	Study design does not meet review criteria
Hu 2016	Intervention does not meet review criteria
Jiao 2019	Patient population does not have a diagnosis of OAB
Johnstone 2003	Patient population does not have a diagnosis of OAB
Kim 2008	Patient population does not have a diagnosis of OAB
Kubista 1976	Patient population does not have a diagnosis of OAB
Kwon 2014	Intervention does not meet review criteria
Lee 2016	Intervention does not meet review criteria
Liao 2007	Patient population does not have a diagnosis of OAB
Liao X 2007	Intervention does not meet review criteria
Lillie 2014	Not a research paper: letter to the journal editor
Liu 1998	Patient population does not have a diagnosis of OAB
Liu 2010	Study design does not meet review criteria
Liu 2013	Patient population does not have a diagnosis of OAB
Liu 2015a	Patient population does not have a diagnosis of OAB
Liu 2015b	Study design does not meet review criteria
Liu 2016	Patient population does not have a diagnosis of OAB
Liu 2017	Patient population does not have a diagnosis of OAB

Study	Reason for exclusion
Lu 2002	Patient population does not have a diagnosis of OAB
Mao 2012	Intervention does not meet review criteria
Miao 2015	Study design does not meet review criteria
Nam 2017	Comparator does not meet review criteria
Pang 2018	Comparator does not meet review criteria
Penson 2018	Patient population does not have a diagnosis of OAB
Philp 1988	Study design does not meet review criteria
Qu 2013	Study design does not meet review criteria
Ren 2020	Intervention does not meet review criteria
Rong 2015	Study design does not meet review criteria
Ruan 2018	Patient population does not have a diagnosis of OAB
Shen 2012a	Patient population does not have a diagnosis of OAB
Shen 2012b	Patient population does not have a diagnosis of OAB
Su 2013	Patient population does not have a diagnosis of OAB
Su 2020a	Study design does not meet review criteria
Su 2020b	Study design does not meet review criteria
Suen 2015	Patient population does not have a diagnosis of OAB
Tang 2016	Patient population does not have a diagnosis of OAB
Wan 2019	Intervention does not meet review criteria
Wang 2008	Comparator does not meet review criteria
Wang 2013b	Study design does not meet review criteria
Wang 2015	Patient population does not have a diagnosis of OAB
Wang 2016	Patient population does not have a diagnosis of OAB
Wang 2017a	Not a research paper: letter to the journal editor
Wang 2017b	Intervention does meet review criteria
Wang 2019	Patient population does not have a diagnosis of OAB
Xie 2020	Intervention does not meet review criteria
Xiong 2020	Study design does not meet review criteria

Study	Reason for exclusion
Xu 2010	Patient population does not have a diagnosis of OAB
Xu 2016	Patient population does not have a diagnosis of OAB
Yang 2020	Study design does not meet review criteria
Zhang 1999	Study design does not meet review criteria
Zhang 2012	Study design does not meet review criteria
Zhao 2012	Study design does not meet review criteria
Zhao 2013	Patient population does not have a diagnosis of OAB
Zhao 2013a	Intervention does not meet review criteria
Zhao 2016	Patient population does not have a diagnosis of OAB
Zheng 1990	Study design does not meet review criteria
Zheng 1992	Patient population does not have a diagnosis of OAB
Zheng 2015	Patient population does not have a diagnosis of OAB
Zhishun 2002	Patient population does not have a diagnosis of OAB
Zhong 2016	Study design does not meet review criteria
Zhu 2018	Study design does not meet review criteria
Zhu 2021	Patient population does not have a diagnosis of OAB

OAB: overactive bladder

Characteristics of studies awaiting classification *[ordered by study ID]*

Bulut 2014

Methods	2-group comparative method but it is unclear from the abstract if the participants were randomly allocated
Participants	20 women diagnosed with OAB
Interventions	Group A: 10 sessions of electro-acupuncture n = 10; no details were given on the acupuncture points used or the treatment regime
	Group B: 2 mg tolterodine twice daily orally for 3 months n = 10
Outcomes	Urodynamic parameters
	Authors reported that both groups demonstrated significant improvement but there was no statistically significant difference between groups
Notes	These details were taken from a conference abstract. We have been unable to contact the research team or source a full-text version of the report.

Han 2011

Methods	RCT
Participants	48 male outpatients diagnosed with overactive bladder
Interventions	Electro-acupuncture group: electro-acupuncture with acupoints Huyang (BL 35), Ciliao (BL 32), Qugu (CV 2), Huiyin (CV 1). Needles were retained for 30 minutes, once a day, for 14 days.
	Control group: tolterodine tartrate tablets 2 mg taken orally, 2 mg, twice a day, for 14 days
Outcomes	Electro-acupuncture group: 62.5% patients were cured and 87.5% patients showed effective
	Control group: 54.2% patients were cured and 79.2% patients showed effective
	There was significant difference between the two groups (P < 0.01)
Notes	This information was taken from an abstract published only in Chinese. The Chinese speaking review authors were unable to locate the full paper this information relates to.

OAB: overactive bladder; RCT: randomised controlled trial

Characteristics of ongoing studies *[ordered by study ID]*

Huang 2020

Study name	Randomized controlled trial for the efficacy of electroacupuncture in the treatment of urge urinary incontinence: a clinical study protocol
Methods	**Study design:** RCT
Participants	100 men and women (as stated in the published protocol)
	Inclusion criteria: diagnosed with urge urinary incontinence by a urologist; 18 to 75 years; frequent urination, urgency and urinary incontinence; no drug treatment during the study and no acupuncture treatment within 1 month prior to the study; not participating in other clinical studies within 2 weeks prior to this study; course of disease at least 3 months; patient's vital signs are stable, and is conscious enough to be examined and treated; signed an informed consent form to volunteer in the study
	Exclusion criteria: history of botulinum toxin injection of the bladder or pelvic muscles in the past year; urinary tract infections or vaginal infections during the study period; undergoing implantable pelvic stimulator therapy during the study period; electrostimulation applied to patients in the pelvic region, back and leg areas during the study period; use of drugs that can influence the outcomes before or during the study; participating in other clinical research related to gynaecology, urinary system or kidney function; coagulopathy or taking anticoagulants; severe heart, liver or kidney damage; pregnancy or lactation; patients who are generally in poor condition and are unable to co-operate; pacemaker; severely afraid of needles; prone to fainting; metal allergy
Interventions	**Group I:** electro-acupuncture. Using points Bladder 32, 33 and 35. Acupuncture points are continuously stimulated with 100 Hz wave and a 1 to 5 mA electric current for 30 minutes. Participants will receive treatment 3 times per week for 8 weeks, a total of 24 treatments. Follow-up continues for 24 weeks.
	Group II: sham electro-acupuncture. Using non-acupuncture points located 20 mm lateral to Bladder 32, 33 and 35. Electrical stimulation will be attached but no power will be applied. The participants are told that an effective slight current input will be applied that may not result in a sensation of stimulation. Participants will receive treatment 3 times per week for 8 weeks, a total of 24 treatments. Follow-up continues for 24 weeks.

Huang 2020 *(Continued)*

Outcomes	**Primary:** measured at baseline, 4 weeks (during treatment), 8 weeks (after treatment), 24 weeks (1st follow-up visit) and 32 weeks (2nd follow-up visit) • ICIQ-SF score • Urinary incontinence episodes in 24 hours - 3-day bladder diary information • Urgency episodes in 24 hours - 3-day bladder diary information **Secondary:** measured at baseline, 8 weeks (treatment completion) and 32 weeks (2nd follow-up visit) • 24-hour urine volume - 3-day bladder diary information • 24-hour frequency of micturition - 3-day bladder diary information • Incontinence Quality of Life (IQoL) score
Starting date	January 2020
Contact information	Qian Mo e-mail: 1404326639@qq.com
Notes	Study lead contacted by email on 12 August 2021 regarding study progress **OAB diagnosis:** the ICS definition of OAB includes urge urinary incontinence. A diagnosis of OAB requires the person to have one or more of the following: urgency, frequency, urge urinary incontinence and nocturia. This study focuses on the incontinence element of OAB but sufferers would be compliant with the definition set out by the ICS.

Jia 2015

Study name	The effectiveness, superiority and safety of electro-acupuncture on overactive bladder: multi-centre RCT
Methods	**Study design:** RCT
Participants	180 participant, 60 in each arm **Inclusion criteria:** aged 18 to 75; men or women; clinical diagnosis of overactive bladder; more than 8 voids per day; no relevant drug use within 2 weeks and no acupuncture treatment within 1 month before enrolling in the study; symptoms for longer than 3 months; capable of giving informed consent; willing to follow study procedures **Exclusion criteria:** OAB symptoms secondary to other diseases; stress incontinence; urinary tract infections or vaginal infections; implanted pelvic stimulator; current use of electric therapy on pelvic/back/legs; current use of botox on vesical or pelvic muscles; undergoing clinical investigation of gynaecological, urological or renal systems; other severe diseases impacting cognition and ability to participate; pregnant or breastfeeding women; coagulation disorders or taking anti-coagulation drugs; cardiac pace maker; metal allergy; needle phobia; electro-acupuncture or taking solifenacin within 4 weeks of commencing the study
Interventions	**Group I:** electro-acupuncture. Using Bladder 33 point bilaterally - 75 mm needles at a depth of 50 mm to 60 mm with 60 degree angle. Electrical stimulation applied for 30 mins x 3 per week for 8 weeks, 24 treatments in total. **Group II:** sham electro-acupuncture. Blunt needles are inserted into an adhesive pad but do not pierce the skin at the Bladder 33 point - the needles are lifted, thrust and twirled to simulate insertion. The electrical stimulation unit has been modified to appear to deliver current but no current is passed into the participants' tissues. The treatment regime was the same as the active EA regime. **Group III:** medication; 5 mg solifenacin tablets once per day 30 minutes before eating for 8 weeks

Jia 2015 *(Continued)*

Outcomes	**Primary outcome**
	• Change from baseline in mean frequency of micturitions per 24 hours
	Secondary outcomes
	• Response rate of improvement in symptoms
	• Patient-rated global assessments of treatment benefit, satisfaction and willingness to continue
	• OAB symptom measurement based on bladder diaries
	• OAB-Q questionnaire
Starting date	October 2014
Contact information	Jia Baohui
Notes	Registration last updated 25 May 2015

Pang 2021

Study name	Acupuncture for overactive bladder in adults
Methods	RCT
Participants	110 men and women
	Inclusion criteria:
	• 18 years to 65 years
	• Present symptoms of urinary frequency and urgency for more than 3 months
	• With a total score of more than 3 points on the overactive Bladder Symptom Score (OABSS) and a score of more than 2 points on question 3 of OABSS
	Exclusion criteria:
	• With other lower urinary tract disorders (e.g. urinary tract infection, bladder outlet obstruction, neurogenic bladder, interstitial cystitis, etc.)
	• With previous pelvic floor surgery
	• Post-void residual urine volume more than 100 mL
	• With neurological disease or psychiatric illness
	• Taking medications affecting lower urinary tract function
	• With contraindications to acupuncture
	• Pregnant women
Interventions	**Group A**
	Participants will receive acupuncture, 3 times per week for 8 weeks. The selected acupoints include bilateral BL33, BL35, SP6 and ST36. All acupoint areas have been sterilised before acupuncture. For BL33, a needle (Φ0.40 × 100 mm) will be inserted with an angle of 60° in an inferomedial direction at a depth of 90 mm to 100 mm. For BL35, the same needle will be inserted with a direction to the ischial rectal fossa at a depth of 60 mm to 70 mm deep. For SP6 and ST36, needles (Φ0.30 × 50mm) will be directly inserted at a depth of 25 mm to 30 mm deep. After the needles are inserted, a portable electro-acupuncture machine will be connected to the handles of needles located in BL33 and BL35 to provide the electrical stimulation for 30 minutes with a disperse-dense wave (4/20 Hz). All current intensities will be as high as can be tolerated.
	Group B

Pang 2021 *(Continued)*

The sham acupoints will be located at 20 mm outward to BL33, BL35, SP6 and ST36, and the needless will be inserted with a depth of 2 mm. BL33 and BL35 will not receive any electrical stimulation, though the handles of the needles will be connected to the same machine as the acupuncture group, and the parameter setting and course are also the same.

Outcomes	**Primary outcome** • Change in number of micturition episodes per 24 hours (time frame: before treatment (baseline), 8-week (post-treatment) and 12-week (follow-up)). Assessed by 72-hour bladder diary. **Secondary outcomes** • Number of urinary urgency episodes per 24 hours (time frame: before treatment (baseline), 8-week (post-treatment) and 12-week (follow-up)). Assessed by 72-hour bladder diary. • Number of daytime micturition episodes per 24 hours (time frame: Before treatment (baseline), 8-week (post-treatment) and 12-week (follow-up)) Assessed by 72-hour bladder diary. • Number of nocturia episodes per 24 hours (time frame: Before treatment (baseline), 8 week (post-treatment) and 12 week (follow-up)). Assessed by 72-hour bladder diary. • Change in mean volume voided per micturition (time frame: before treatment (baseline), 8-week (post-treatment) and 12-week (follow-up)). Assessed by 72-hour bladder diary. • Change in OABSS questionnaire (time frame: before treatment (baseline), 8-week (post-treatment) and 12-week (follow-up)). • Assessed by Overactive Bladder Symptom Score (OABSS) questionnaire. OABSS includes 4 questions about individual symptoms, and the total score ranged from 0 to 15, with higher scores indicating more severe symptoms. The minimal important difference (MID) for the OABSS is 3 points. • Change in OAB-q SF questionnaire (time frame: before treatment (baseline), 8-week (post-treatment) and 12-week (follow-up)). • Assessed by overactive bladder questionnaire short form (OAB-q SF) questionnaire. OAB-q SF includes 6 questions on 6-point Likert-type scales, with the outcomes transformed to a 0- to 100-point scale in which higher scores indicate more severe symptoms. The minimal important difference (MID) for the OAB-q SF is 11 points. • Urinary NGF/Cr level (time frame: before treatment (baseline), 8 weeks (post-treatment)) • Measured by human nerve growth factor (NGF) ELISA Kit. NGF/Cr: NGF normalised to urine creatinine (Cr) • Urinary BDNF/Cr level (time frame: before treatment (baseline), 8 weeks (post-treatment)) • Measured by human brain derived neurotrophic factor (BDNF) ELISA Kit. BDNF/Cr: BDNF normalised to urine creatinine (Cr) • Urinary MCP-1/Cr level (time frame: before treatment (baseline), 8 weeks (post-treatment)) • Measured by human monocyte chemoattractant protein-1 (MCP-1) ELISA Kit. MCP-1/Cr: MCP-1 normalised to urine creatinine (Cr)
Starting date	Last update 2 March 2022 - status "Not yet recruiting"
Contact information	Lead author email address pangran2002@sina.com
Notes	—

Shen 2019

Study name	A randomised controlled trial for the efficacy and safety of electro-acupuncture in the treatment of female overactive bladder
Methods	**Study design:** RCT
Participants	68 female participants

	Inclusion criteria: compliance with diagnostic criteria; women aged between 18 and 60; Chinese or western medicines for OAB have not been used for 1 month prior to entry into study; give informed written consent
	Exclusion criteria: UTI or lower urinary tract construction; neurogenic bladder; urethral dysfunction; post void residual of more than 50 mL; myasthenia gravis; ulcerative colitis; glaucoma; allergies or contra-indications to tolterodine; unable to comply with study procedures (judged by research staff); pregnancy or breastfeeding; pacemaker; metal allergy; severe needle phobia; non-compliance with study procedures leading to incomplete data
Interventions	**Group I (n = 34):** electro-acupuncture. No further details available.
	Group II (n = 34): medicine. No further details available.
Outcomes	• Overactive bladder symptom score (OABSS) • Nerve growth factor levels in urine • Brain derived neurotrophic levels in urine
Starting date	1 May 2019
Contact information	Jianwu Shen
Notes	Study lead contacted 12 August 2021 for progress update

Sheyn 2017

Study name	Comparison of electro-acupuncture to mirabegron on symptoms of overactive bladder in women who have failed anti-cholinergic therapy
Methods	**Study design:** RCT
Participants	80 females
	Inclusion criteria: 18 years and older; female; informed written consent; documented symptoms of OAB for more than 6 months; have failed at least one anti-cholinergic medication defined as no change or unsatisfactory improvement in symptom severity after 6 weeks of a daily regimen
	Exclusion criteria: under 18 years; unable or willing to provide informed consent; illiterate; non-English speaking or reading; current UTI; history of interstitial cystitis; bleeding disorder; currently taking anti-coagulation medication; are currently or have in the past taken mirabegron; currently having acupuncture for another condition; currently undergoing pelvic floor training; receiving treatment for a gynaecological or urological cancer; pregnancy; implanted pacemaker; poorly or uncontrolled hypertension
Interventions	**Group I:** electro-acupuncture; 30 minutes once per week for 6 weeks
	Group II: medication; 50 mg mirabegron once daily for 6 weeks
Outcomes	All outcomes assessed 3 weeks after initiating treatment, 6 weeks after therapy initiation and monthly intervals for 3 months from therapy initiation for the acupuncture group • Incontinence Impact Questionnaire (IIQ-7) • Overactive Bladder Symptom Score (OABSS) • Urogenital Distress Inventory (UDI-6) • Day frequency • Incontinence episodes

Sheyn 2017 *(Continued)*

	• Nocturia
Starting date	1 July 2017
Contact information	David Sheyn
Notes	Registration last updated 27 March 2017

Wen 2020

Study name	Efficacy evaluation for electro-acupuncture in the treatment of neurogenic urinary retention and overactive bladder
Methods	**Study design:** RCT
Participants	420 men and women; 140 in each arm
	Inclusion criteria: symptoms of OAB that meet ICS and AUA criteria; aged 18 to 75; symptoms for more than 3 months; overactive bladder symptom score (OABSS) of more than 6; give informed written consent to participate
	Exclusion criteria: OAB symptoms secondary to another disease; mixed incontinence; presence of UTI; pelvic organ prolapse of grade 2 or more; post void residual of more than 100 mL; metal allergy; fear of acupuncture; solifenacin is contraindicated; uncontrolled diabetes; severe heart, liver or kidney disease; mental illness; coagulation dysfunction; pacemaker; pregnancy or breastfeeding; taking medication for OAB or having acupuncture within 1 month of commencing the trial; participating in any other trial
Interventions	**Group I:** electro-acupuncture; performed 3 times per week for the first 4 weeks and twice a week for the following 8 weeks - 28 treatments in total
	Group II: weak electro-acupuncture; performed 3 times per week for the first 4 weeks and twice a week for the following 8 weeks - 28 treatment in total
	Group III: drug treatment; solifenacin 5 mg once per day for 32 weeks
Outcomes	All measures applied at the end of weeks 4, 8, 12, 20 and 32
	• Overactive bladder symptom score
	• Average urinary frequency in 24 hours, frequency of nocturia, frequency of incontinence, frequency of urination urgency
	• OAB-Q questionnaire
Starting date	1 January 2019
Contact information	Li Ning
Notes	Study lead contacted by email on 12 August 2021 regarding study progress

EA: electro-acupuncture
ICIQ-SF: International Consultation on Incontinence Questionnaire - Urinary Incontinence Short Form
ICS: International Continence Society
IIQ-7: Incontinence Impact Questionnaire
IQoL: Incontinence Quality of Life
OAB: overactive bladder
OAB-Q: Overactive Bladder Questionnaire
OABSS: overactive bladder symptom score

RCT: randomised controlled trial
UDI-6: Urogenital Distress Inventory
UTI: urinary tract infection

DATA AND ANALYSES

Comparison 1. Acupuncture versus no treatment

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Cure or improvement in overactive bladder symptoms	1		Other data	No numeric data

Analysis 1.1. Comparison 1: Acupuncture versus no treatment, Outcome 1: Cure or improvement in overactive bladder symptoms

Cure or improvement in overactive bladder symptoms

Study	Acupuncture group median score	IQR	Number	No treatment group median score	IQR	Number
Solberg 2016	6.5	4	12	10	7.3	12

Comparison 2. Acupuncture versus sham acupuncture

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.1 Cure or improvement in urinary symptoms	3	151	Std. Mean Difference (IV, Random, 95% CI)	-0.36 [-1.03, 0.31]
2.2 Number of minor adverse events	4	222	Risk Ratio (M-H, Fixed, 95% CI)	1.28 [0.30, 5.36]
2.3 Presence or absence of urinary urgency	1	25	Mean Difference (IV, Fixed, 95% CI)	-4.52 [-11.33, 2.29]
2.4 Episodes of urinary incontinence in a 24-hour period	2	121	Mean Difference (IV, Fixed, 95% CI)	0.55 [-1.51, 2.60]
2.5 Episodes of nocturia	1	25	Mean Difference (IV, Fixed, 95% CI)	-2.52 [-4.80, -0.24]
2.6 Improvement in objective measures of urinary incontinence (first sensation of filling in mL)	1	45	Mean Difference (IV, Fixed, 95% CI)	17.20 [4.66, 29.74]
2.7 Improvement in objective measures of urinary incontinence (first urge in mL)	1	45	Mean Difference (IV, Fixed, 95% CI)	-10.00 [-28.57, 8.57]
2.8 Improvement in objective measures of urinary incontinence (maximum cystometric capacity in mL)	1	45	Mean Difference (IV, Fixed, 95% CI)	53.80 [26.68, 80.92]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.9 Improvement in objective measures of urinary incontinence (QMax mL/sec)	1	45	Mean Difference (IV, Fixed, 95% CI)	-1.40 [-3.65, 0.85]
2.10 Improvement in objective measures of urinary incontinence (post void residual in mL)	1	45	Mean Difference (IV, Fixed, 95% CI)	0.90 [-2.81, 4.61]
2.11 Improvement in general quality of life	1	45	Mean Difference (IV, Fixed, 95% CI)	-260.00 [-314.60, -205.40]

Analysis 2.1. Comparison 2: Acupuncture versus sham acupuncture, Outcome 1: Cure or improvement in urinary symptoms

Study or Subgroup	Acupuncture Mean	SD	Total	Sham acupuncture Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Engberg 2009	70	31.97	4	64.22	34.59	5	17.5%	0.15 [-1.16, 1.47]
Lin 2020	6.9	2.8	49	7.1	2.4	48	45.5%	-0.08 [-0.47, 0.32]
Zhang 2015	5	2.2	23	7.4	2.8	22	37.0%	-0.94 [-1.56, -0.32]
Total (95% CI)			**76**			**75**	**100.0%**	**-0.36 [-1.03, 0.31]**

Heterogeneity: Tau² = 0.22; Chi² = 5.77, df = 2 (P = 0.06); I² = 65%
Test for overall effect: Z = 1.04 (P = 0.30)
Test for subgroup differences: Not applicable

Std. Mean Difference IV, Random, 95% CI
-20 -10 0 10 20
Favours acupuncture   Favours sham acupuncture

Analysis 2.2. Comparison 2: Acupuncture versus sham acupuncture, Outcome 2: Number of minor adverse events
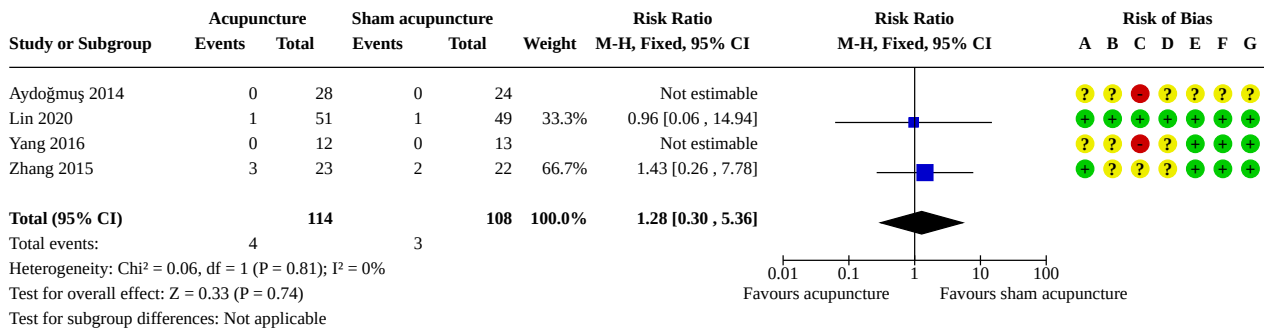
Study or Subgroup	Acupuncture Events	Total	Sham acupuncture Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Risk of Bias A B C D E F G
Aydoğmuş 2014	0	28	0	24		Not estimable	? ? ● ? ? ? ?
Lin 2020	1	51	1	49	33.3%	0.96 [0.06, 14.94]	+ + + + + + +
Yang 2016	0	12	0	13		Not estimable	? ? ● ? + + +
Zhang 2015	3	23	2	22	66.7%	1.43 [0.26, 7.78]	+ ? ? ? + + +
Total (95% CI)		**114**		**108**	**100.0%**	**1.28 [0.30, 5.36]**	
Total events:	4		3				

Heterogeneity: Chi² = 0.06, df = 1 (P = 0.81); I² = 0%
Test for overall effect: Z = 0.33 (P = 0.74)
Test for subgroup differences: Not applicable

Risk Ratio M-H, Fixed, 95% CI
0.01 0.1 1 10 100
Favours acupuncture   Favours sham acupuncture

Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

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Analysis 2.3. Comparison 2: Acupuncture versus sham acupuncture, Outcome 3: Presence or absence of urinary urgency

Study or Subgroup	Acupuncture Mean	Acupuncture SD	Acupuncture Total	Sham acupuncture Mean	Sham acupuncture SD	Sham acupuncture Total	Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI
Yang 2016	3.17	6.83	12	7.69	10.31	13	100.0%	-4.52 [-11.33 , 2.29]	
Total (95% CI)			**12**			**13**	**100.0%**	**-4.52 [-11.33 , 2.29]**	

Heterogeneity: Not applicable
Test for overall effect: Z = 1.30 (P = 0.19)
Test for subgroup differences: Not applicable

Favours acupuncture   Favours sham acupuncture

Analysis 2.4. Comparison 2: Acupuncture versus sham acupuncture, Outcome 4: Episodes of urinary incontinence in a 24-hour period

Study or Subgroup	Acupuncture Mean	Acupuncture SD	Acupuncture Total	Sham acupuncture Mean	Sham acupuncture SD	Sham acupuncture Total	Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI	Risk of Bias A B C D E F G
Lin 2020	4.3	7.4	48	2.7	4.6	48	69.8%	1.60 [-0.86 , 4.06]		+ + + + + + +
Yang 2016	0.42	1.58	12	2.31	6.69	13	30.2%	-1.89 [-5.63 , 1.85]		? ? − ? + + +
Total (95% CI)			**60**			**61**	**100.0%**	**0.55 [-1.51 , 2.60]**		

Heterogeneity: Chi² = 2.33, df = 1 (P = 0.13); I² = 57%
Test for overall effect: Z = 0.52 (P = 0.60)
Test for subgroup differences: Not applicable

Favours acupuncture   Favours sham acupuncture

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Analysis 2.5. Comparison 2: Acupuncture versus sham acupuncture, Outcome 5: Episodes of nocturia
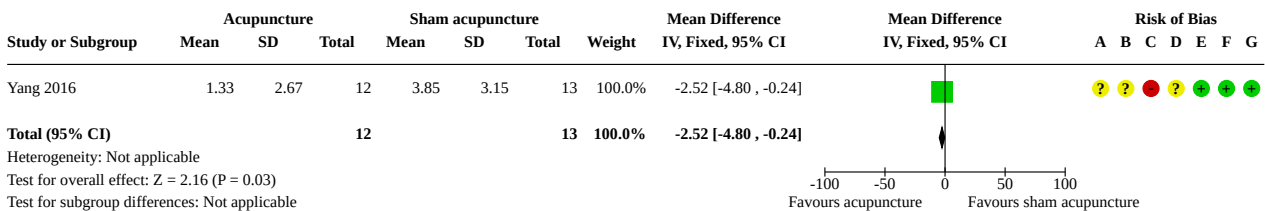
Study or Subgroup	Acupuncture Mean	Acupuncture SD	Acupuncture Total	Sham acupuncture Mean	Sham acupuncture SD	Sham acupuncture Total	Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI	Risk of Bias A B C D E F G
Yang 2016	1.33	2.67	12	3.85	3.15	13	100.0%	-2.52 [-4.80 , -0.24]		? ? − ? + + +
Total (95% CI)			**12**			**13**	**100.0%**	**-2.52 [-4.80 , -0.24]**		

Heterogeneity: Not applicable
Test for overall effect: Z = 2.16 (P = 0.03)
Test for subgroup differences: Not applicable

Favours acupuncture   Favours sham acupuncture

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

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Analysis 2.6. Comparison 2: Acupuncture versus sham acupuncture, Outcome 6: Improvement in objective measures of urinary incontinence (first sensation of filling in mL)

Study or Subgroup	Acupuncture			Sham acupuncture			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI	Risk of Bias A B C D E F G
	Mean	SD	Total	Mean	SD	Total				
Zhang 2015 (1)	150.9	22.3	23	133.7	20.6	22	100.0%	17.20 [4.66 , 29.74]		➕ ❓ ❓ ❓ ➕ ➕ ➕
Total (95% CI)			**23**			**22**	**100.0%**	**17.20 [4.66 , 29.74]**		

Heterogeneity: Not applicable
Test for overall effect: Z = 2.69 (P = 0.007)
Test for subgroup differences: Not applicable

-100   -50   0   50   100
Favours sham acupuncture   Favours acupuncture

Footnotes
(1) First senation of filling in mls

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Analysis 2.7. Comparison 2: Acupuncture versus sham acupuncture, Outcome 7: Improvement in objective measures of urinary incontinence (first urge in mL)

Study or Subgroup	Acupuncture			Sham acupuncture			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI	Risk of Bias A B C D E F G
	Mean	SD	Total	Mean	SD	Total				
Zhang 2015 (1)	175.4	31	23	185.4	32.5	22	100.0%	-10.00 [-28.57 , 8.57]		➕ ❓ ❓ ❓ ➕ ➕ ➕
Total (95% CI)			**23**			**22**	**100.0%**	**-10.00 [-28.57 , 8.57]**		

Heterogeneity: Not applicable
Test for overall effect: Z = 1.06 (P = 0.29)
Test for subgroup differences: Not applicable

-100   -50   0   50   100
Favours sham acupuncture   Favours acupuncture
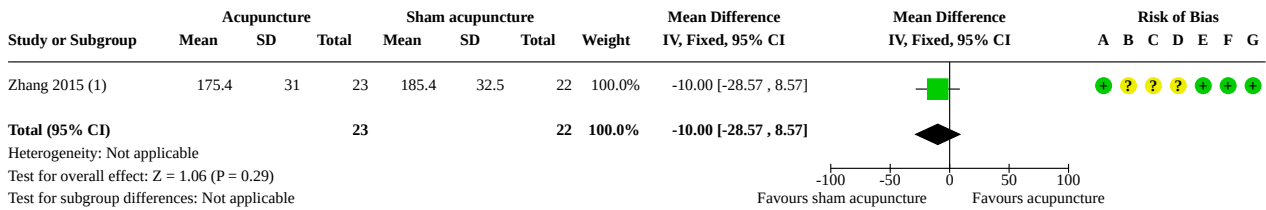
Footnotes
(1) First urge in mls

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Analysis 2.8. Comparison 2: Acupuncture versus sham acupuncture, Outcome 8: Improvement in objective measures of urinary incontinence (maximum cystometric capacity in mL)

Study or Subgroup	Acupuncture			Sham acupuncture			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI
	Mean	SD	Total	Mean	SD	Total			
Zhang 2015 (1)	329.8	51.7	23	276	40.7	22	100.0%	53.80 [26.68 , 80.92]	
Total (95% CI)			**23**			**22**	**100.0%**	**53.80 [26.68 , 80.92]**	

Heterogeneity: Not applicable
Test for overall effect: Z = 3.89 (P = 0.0001)
Test for subgroup differences: Not applicable

-100   -50   0   50   100
Favours sham acupuncture   Favours acupuncture

Footnotes
(1) Maximum cystometric capacity in mls

Analysis 2.9. Comparison 2: Acupuncture versus sham acupuncture, Outcome 9: Improvement in objective measures of urinary incontinence (QMax mL/sec)

Study or Subgroup	Acupuncture			Sham acupuncture			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI	Risk of Bias A B C D E F G
	Mean	SD	Total	Mean	SD	Total				
Zhang 2015 (1)	15	4.1	23	16.4	3.6	22	100.0%	-1.40 [-3.65 , 0.85]	▮	＋ ? ? ? ＋ ＋ ＋
Total (95% CI)			**23**			**22**	**100.0%**	**-1.40 [-3.65 , 0.85]**	◆	

Heterogeneity: Not applicable
Test for overall effect: Z = 1.22 (P = 0.22)
Test for subgroup differences: Not applicable

-100   -50   0   50   100
Favours sham acupuncture   Favours acupuncture

Footnotes
(1) QMax mls/sec

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Analysis 2.10. Comparison 2: Acupuncture versus sham acupuncture, Outcome 10: Improvement in objective measures of urinary incontinence (post void residual in mL)

Study or Subgroup	Acupuncture			Sham acupuncture			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI
	Mean	SD	Total	Mean	SD	Total			
Zhang 2015 (1)	37	6.6	23	36.1	6.1	22	100.0%	0.90 [-2.81 , 4.61]	▮
Total (95% CI)			**23**			**22**	**100.0%**	**0.90 [-2.81 , 4.61]**	◆

Heterogeneity: Not applicable
Test for overall effect: Z = 0.48 (P = 0.63)
Test for subgroup differences: Not applicable

-100   -50   0   50   100
Favours acupuncture   Favours sham acupuncture

Footnotes
(1) Post void residual in mls

Analysis 2.11. Comparison 2: Acupuncture versus sham acupuncture, Outcome 11: Improvement in general quality of life

Study or Subgroup	Acupuncture			Sham acupuncture			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI	Risk of Bias A B C D E F G
	Mean	SD	Total	Mean	SD	Total				
Zhang 2015 (1)	153.2	77.1	23	413.2	106.7	22	100.0%	-260.00 [-314.60 , -205.40]	▮	＋ ? ? ? ＋ ＋ ＋
Total (95% CI)			**23**			**22**	**100.0%**	**-260.00 [-314.60 , -205.40]**	◆	

Heterogeneity: Not applicable
Test for overall effect: Z = 9.33 (P < 0.00001)
Test for subgroup differences: Not applicable

-500   -250   0   250   500
Favours acupuncture   Favours sham acupuncture

Footnotes
(1) Kings health questionnaire - lower score indicates better quality of life

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
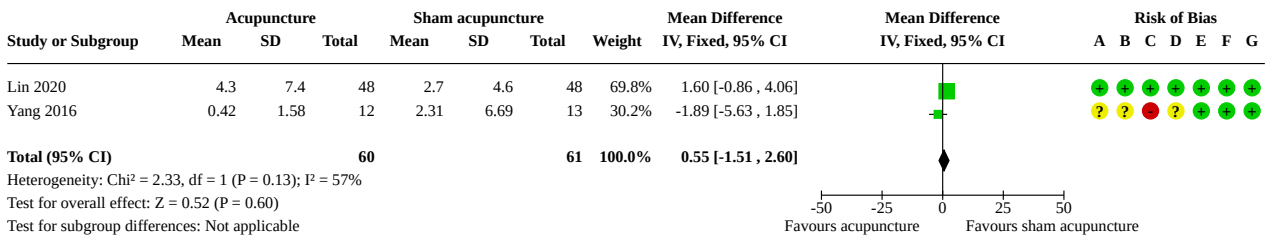(F) Selective reporting (reporting bias)
(G) Other bias

Comparison 3. Acupuncture versus conservative treatment

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.1 Minor adverse events	2	519	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.26, 0.41]

Analysis 3.1. Comparison 3: Acupuncture versus conservative treatment, Outcome 1: Minor adverse events

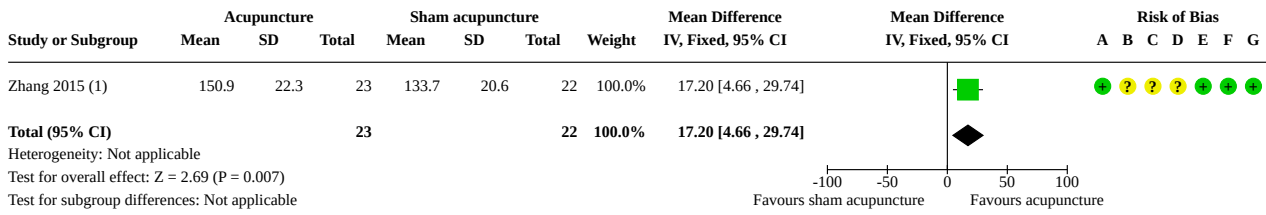| Study or Subgroup	Acupuncture Events	Total	Conservative treatment Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Risk Ratio M-H, Fixed, 95% CI
Liu 2019	62	249	194	248	99.4%	0.32 [0.25 , 0.40]	
Solberg 2016	2	12	1	10	0.6%	1.67 [0.18 , 15.80]	
Total (95% CI)		261		258	100.0%	0.33 [0.26 , 0.41]	
Total events:	64		195				

Heterogeneity: Chi² = 2.06, df = 1 (P = 0.15); I² = 52%
Test for overall effect: Z = 9.84 (P < 0.00001)
Test for subgroup differences: Not applicable

0.02 0.1 1 10 50
Acupuncture   Conservative treatment

Comparison 4. Acupuncture versus medication

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4.1 Cure or improvement in urinary symptoms	5	258	Risk Ratio (M-H, Fixed, 95% CI)	1.25 [1.10, 1.43]
4.2 Number of minor adverse events	8	1004	Risk Ratio (M-H, Fixed, 95% CI)	0.34 [0.26, 0.45]
4.3 Presence or absence of urinary urgency	2	80	Mean Difference (IV, Fixed, 95% CI)	-0.40 [-0.56, -0.24]
4.4 Daytime urinary frequency	4	360	Mean Difference (IV, Random, 95% CI)	0.73 [-0.39, 1.85]
4.5 Episodes of urinary incontinence in a 24-hour period	1	20	Mean Difference (IV, Fixed, 95% CI)	-0.33 [-2.75, 2.09]
4.6 Episodes of nocturia	2	80	Mean Difference (IV, Fixed, 95% CI)	-0.50 [-0.65, -0.36]
4.7 Improvement in objective measures of urinary incontinence (volume of urine voided)	1	60	Mean Difference (IV, Fixed, 95% CI)	-4.00 [-20.71, 12.71]

Analysis 4.1. Comparison 4: Acupuncture versus medication, Outcome 1: Cure or improvement in urinary symptoms

Study or Subgroup	Acupuncture Events	Acupuncture Total	Medication for OAB Events	Medication for OAB Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Risk Ratio M-H, Fixed, 95% CI
Chen 2009	21	24	19	24	21.0%	1.11 [0.86 , 1.43]	
Hong 2015	28	32	20	33	21.8%	1.44 [1.06 , 1.96]	
Wang 2011	18	20	14	20	15.5%	1.29 [0.93 , 1.77]	
Wang 2013a	27	30	26	31	28.3%	1.07 [0.88 , 1.30]	
Yu 2012	20	24	11	20	13.3%	1.52 [0.98 , 2.34]	
Total (95% CI)		**130**		**128**	**100.0%**	**1.25 [1.10 , 1.43]**	
Total events:	114		90				

Heterogeneity: Chi² = 4.93, df = 4 (P = 0.29); I² = 19%

Test for overall effect: Z = 3.40 (P = 0.0007)

Test for subgroup differences: Not applicable

0.01 0.1 1 10 100
Favours medication for OAB   Favours acupuncture

Analysis 4.2. Comparison 4: Acupuncture versus medication, Outcome 2: Number of minor adverse events

Study or Subgroup	Acupuncture Events	Acupuncture Total	Medication Events	Medication Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Risk Ratio M-H, Fixed, 95% CI
Aydoğmuş 2014	0	28	19	30	11.9%	0.03 [0.00 , 0.43]	
Hong 2015	2	32	0	33	0.3%	5.15 [0.26 , 103.30]	
Kelleher 1994	5	20	19	19	12.6%	0.27 [0.13 , 0.55]	
Liu 2019	33	249	90	248	57.1%	0.37 [0.26 , 0.52]	
Shen 2020	3	23	5	22	3.2%	0.57 [0.16 , 2.12]	
Wang 2011	0	20	2	20	1.6%	0.20 [0.01 , 3.92]	
Yang 2016	0	12	8	8	6.4%	0.04 [0.00 , 0.62]	
Yuan 2015	9	118	11	122	6.8%	0.85 [0.36 , 1.97]	
Total (95% CI)		**502**		**502**	**100.0%**	**0.34 [0.26 , 0.45]**	
Total events:	52		154				

Heterogeneity: Chi² = 14.36, df = 7 (P = 0.05); I² = 51%

Test for overall effect: Z = 7.55 (P < 0.00001)

Test for subgroup differences: Not applicable

0.002 0.1 1 10 500
Favours acupuncture   Favours medication

Analysis 4.3. Comparison 4: Acupuncture versus medication, Outcome 3: Presence or absence of urinary urgency
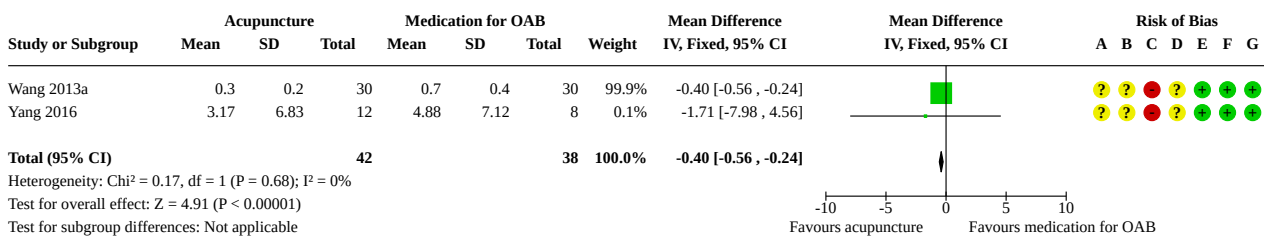
Study or Subgroup	Acupuncture Mean	Acupuncture SD	Acupuncture Total	Medication for OAB Mean	Medication for OAB SD	Medication for OAB Total	Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI	Risk of Bias A B C D E F G
Wang 2013a	0.3	0.2	30	0.7	0.4	30	99.9%	-0.40 [-0.56 , -0.24]		? ? ● ? + + +
Yang 2016	3.17	6.83	12	4.88	7.12	8	0.1%	-1.71 [-7.98 , 4.56]		? ? ● ? + + +
Total (95% CI)			**42**			**38**	**100.0%**	**-0.40 [-0.56 , -0.24]**		

Heterogeneity: Chi² = 0.17, df = 1 (P = 0.68); I² = 0%

Test for overall effect: Z = 4.91 (P < 0.00001)

Test for subgroup differences: Not applicable

-10 -5 0 5 10
Favours acupuncture   Favours medication for OAB
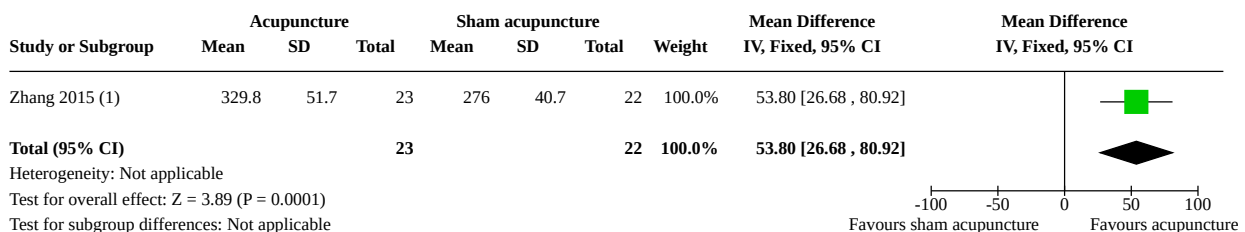
Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
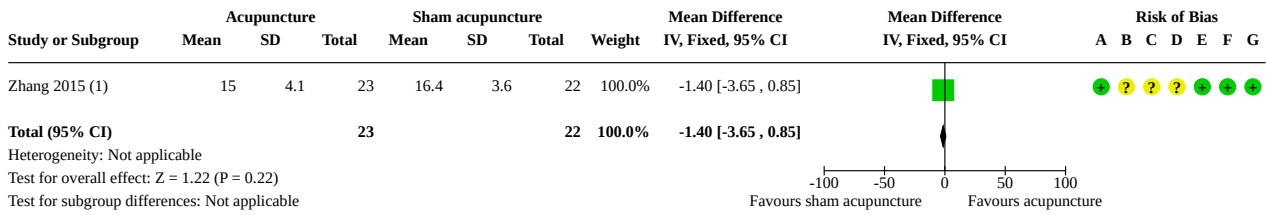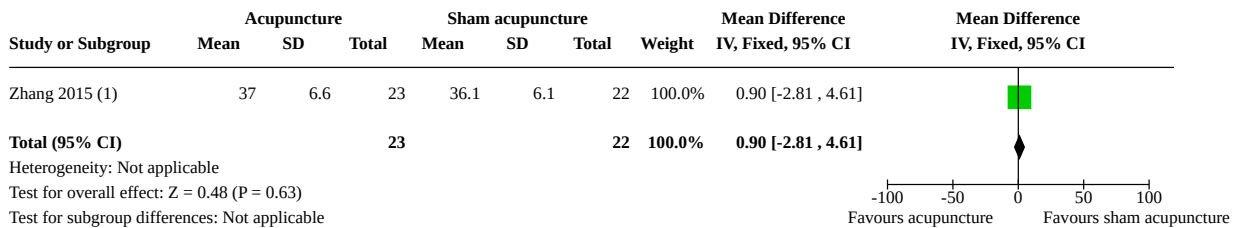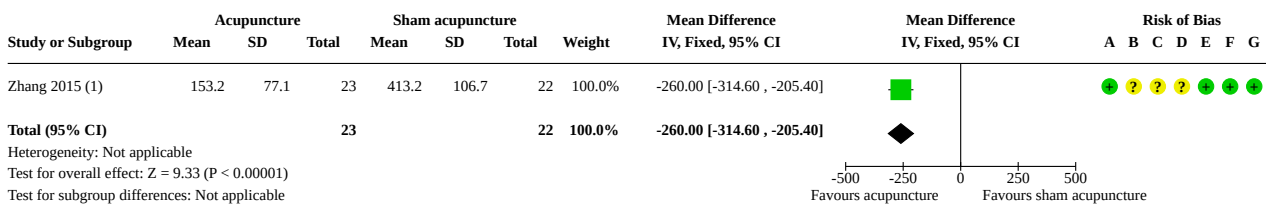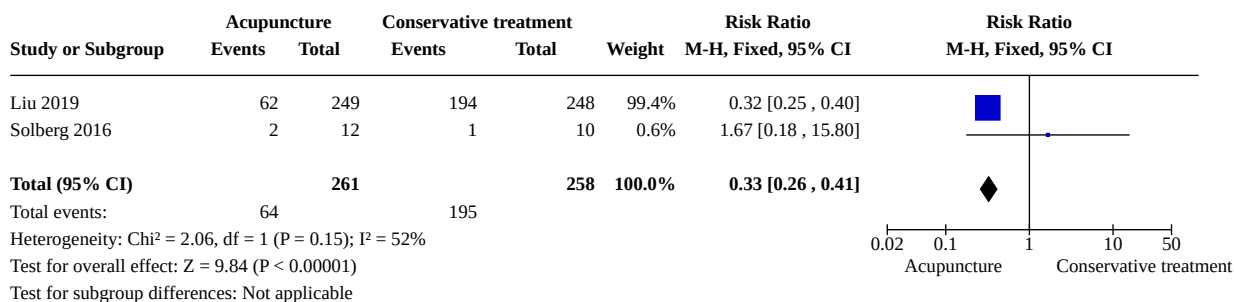(F) Selective reporting (reporting bias)
(G) Other bias

Analysis 4.4. Comparison 4: Acupuncture versus medication, Outcome 4: Daytime urinary frequency
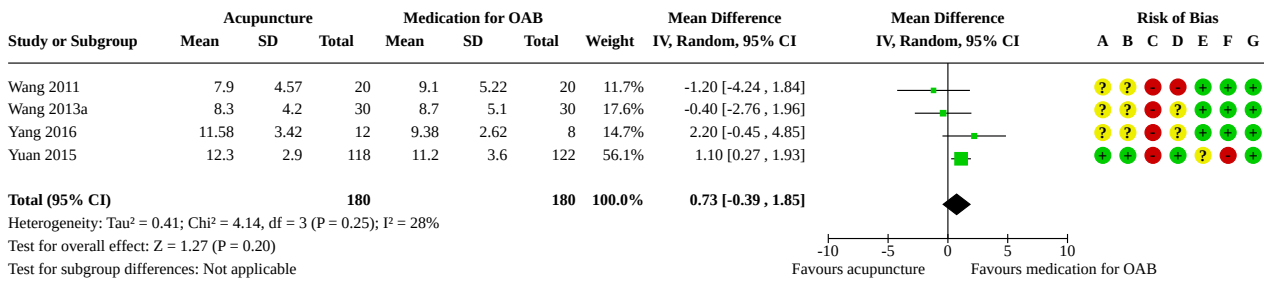
Study or Subgroup	Acupuncture			Medication for OAB			Weight	Mean Difference IV, Random, 95% CI	Mean Difference IV, Random, 95% CI	Risk of Bias A B C D E F G
	Mean	SD	Total	Mean	SD	Total				
Wang 2011	7.9	4.57	20	9.1	5.22	20	11.7%	-1.20 [-4.24 , 1.84]		? ? ● ● ● ● ●
Wang 2013a	8.3	4.2	30	8.7	5.1	30	17.6%	-0.40 [-2.76 , 1.96]		? ? ● ? ● ● ●
Yang 2016	11.58	3.42	12	9.38	2.62	8	14.7%	2.20 [-0.45 , 4.85]		? ? ● ? ● ● ●
Yuan 2015	12.3	2.9	118	11.2	3.6	122	56.1%	1.10 [0.27 , 1.93]		● ● ● ● ? ● ●
Total (95% CI)			**180**			**180**	**100.0%**	**0.73 [-0.39 , 1.85]**		

Heterogeneity: Tau² = 0.41; Chi² = 4.14, df = 3 (P = 0.25); I² = 28%
Test for overall effect: Z = 1.27 (P = 0.20)
Test for subgroup differences: Not applicable

-10 -5 0 5 10
Favours acupuncture   Favours medication for OAB

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Analysis 4.5. Comparison 4: Acupuncture versus medication, Outcome 5: Episodes of urinary incontinence in a 24-hour period

Study or Subgroup	Acupuncture			Medication for OAB			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI	Risk of Bias A B C D E F G
	Mean	SD	Total	Mean	SD	Total				
Yang 2016	0.42	1.58	12	0.75	3.25	8	100.0%	-0.33 [-2.75 , 2.09]		? ? ● ? ● ● ●
Total (95% CI)			**12**			**8**	**100.0%**	**-0.33 [-2.75 , 2.09]**		

Heterogeneity: Not applicable
Test for overall effect: Z = 0.27 (P = 0.79)
Test for subgroup differences: Not applicable

-20 -10 0 10 20
Favours acupuncture   Favours medication for OAB

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Analysis 4.6. Comparison 4: Acupuncture versus medication, Outcome 6: Episodes of nocturia

Study or Subgroup	Acupuncture			Medication for OAB			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI	Risk of Bias A B C D E F G
	Mean	SD	Total	Mean	SD	Total				
Wang 2013a	0.4	0.1	30	0.9	0.4	30	99.4%	-0.50 [-0.65 , -0.35]		? ? ● ? ● ● ●
Yang 2016	1.33	2.67	12	2.38	1.62	8	0.6%	-1.05 [-2.93 , 0.83]		? ? ● ? ● ● ●
Total (95% CI)			**42**			**38**	**100.0%**	**-0.50 [-0.65 , -0.36]**		

Heterogeneity: Chi² = 0.33, df = 1 (P = 0.57); I² = 0%
Test for overall effect: Z = 6.71 (P < 0.00001)
Test for subgroup differences: Not applicable

-10 -5 0 5 10
Favours acupuncture   Favours medication for OAB

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
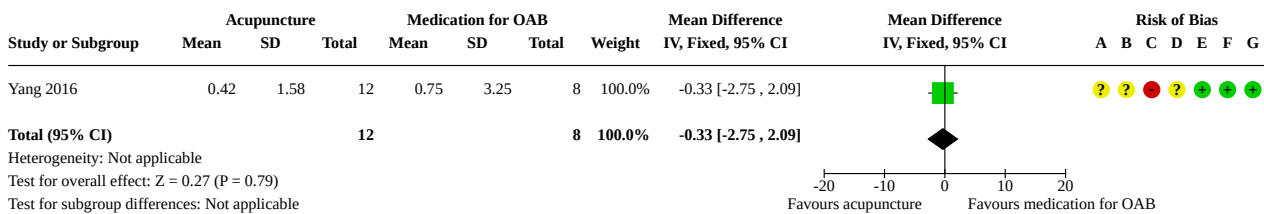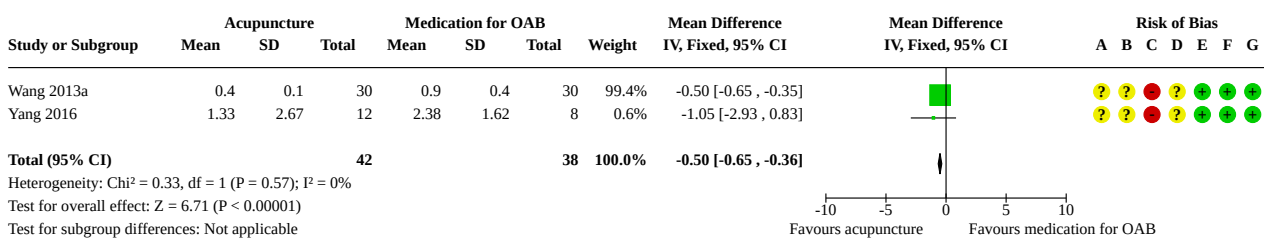(F) Selective reporting (reporting bias)
(G) Other bias

Analysis 4.7. Comparison 4: Acupuncture versus medication, Outcome 7:
Improvement in objective measures of urinary incontinence (volume of urine voided)

Study or Subgroup	Acupuncture			Medication for OAB			Weight	Mean Difference IV, Fixed, 95% CI [mL]	Mean Difference IV, Fixed, 95% CI [mL]	Risk of Bias A B C D E F G
	Mean [mL]	SD [mL]	Total	Mean [mL]	SD [mL]	Total				
Wang 2013a	218.3	35.2	30	222.3	30.7	30	100.0%	-4.00 [-20.71 , 12.71]	■	? ? ● ? + + +
Total (95% CI)			**30**			**30**	**100.0%**	**-4.00 [-20.71 , 12.71]**	◆	

Heterogeneity: Not applicable
Test for overall effect: Z = 0.47 (P = 0.64)
Test for subgroup differences: Not applicable

-100 -50 0 50 100
Favours medication for OAB   Favours acupuncture

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
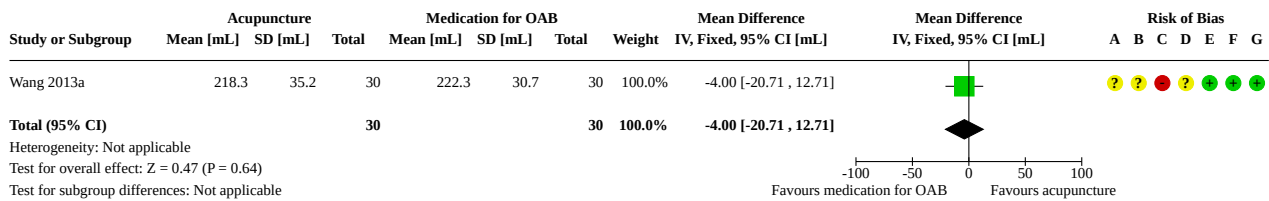(F) Selective reporting (reporting bias)
(G) Other bias

ADDITIONAL TABLES

Table 1. Study duration, treatment frequency and follow-up period

Study ID	Number/sex of participants	Length of inter-vention	Number of acupuncture treatments performed	Number of points used	Follow-up
Aydoğmuş 2014	90 women	4 weeks	8	15	No
Chen 2009	48 men	2 weeks	14	6	No
Engberg 2009	11 women	6 weeks	12	12	4 weeks after treatment was completed
Hong 2015	66 - sex not stated	4 weeks	20	8	No
Kelleher 1994	39 women	6 weeks	6	16	No
Lin 2020	45 men 55 women	8 weeks	16	13	3 months after treatment was completed
Liu 2019	500 women	12 weeks	36	4	24 weeks after treatment was completed
Shen 2020	45 women	4 weeks	12	10	No
Solberg 2016	34 women	12 weeks	12	14	No
Wang 2011	40 women	4 weeks	28	13	No
Wang 2013a	60 women	4 weeks	28	15	No
Yang 2016	33 men and women - ratios not stated	8 weeks	24	4	No

Table 1.   Study duration, treatment frequency and follow-up period *(Continued)*

Yu 2012	44 men and women - ratios not stated	2 weeks	28	6	No
Yuan 2015	240 women	4 weeks	4	7	No
Zhang 2015	45 women	6 weeks	30	6	No

Table 2.   Adverse events reported in included studies

Study	Major adverse event reporting	Type of minor adverse event	Number in acupuncture group	Number in comparator group
Aydoğmuş 2014	Specifically reported no major adverse events in the text of the report	Dry mouth	0	19
Chen 2009	No explicit discussion in the study report regarding major adverse events	No reported	Not reported	Not reported
Engberg 2009	Specifically reported no major adverse events in the text of the report	Drowsiness and/or	3	0
		bleeding at needling site	2	0
Hong 2015	Specifically reported no major adverse events in the text of the report	Pain at needling site	1	0
		Bruising	1	0
Kelleher 1994	No explicit discussion in the study report regarding major adverse events	Dry mouth	0	19
Lin 2020	Specifically reported no major adverse events in the text of the report	Pain at needling site	1	0
		Allergic reaction to adhesive tape used to secure sham needles	0	1
Liu 2019	Specifically reported no major adverse events in the text of the report	Bruising	10	0
		Digestive system disorders	4	21
		Dry mouth	0	62
		Unrelated fracture	0	1
Shen 2020	Specifically reported no major adverse events in the text of the report	Discomfort at needling site	3	0
		Dry mouth	0	5 (including 3 withdrawn)

Table 2. Adverse events reported in included studies *(Continued)*

Solberg 2016	Specifically reported no major adverse events in the text of the report	Tiredness	1	0
Wang 2011	No explicit discussion in the study report regarding major adverse events	Dry mouth	0	2
Wang 2013a	No explicit discussion in the study report regarding major adverse events	None reported	Not reported	Not reported
Yang 2016	Specifically reported no major adverse events in the text of the report	Dry mouth	0	8
Yu 2012	No explicit discussion in the study report regarding major adverse events	None reported	Not reported	Not reported
Yuan 2015	Specifically reported no major adverse events in the text of the report	Dry mouth	0	11
		Needling pain	9	0
Zhang 2015	Specifically reported no major adverse events in the text of the report	Minor pain at needling site	2	3

APPENDICES

Appendix 1. Glossary of terms

Acetylcholine: a substance that transmits nerve impulses within the central and peripheral nervous systems.

Acupuncture: a treatment derived from ancient Chinese medicine. Fine needles are inserted at certain sites in the body for therapeutic or preventative purposes.

Acupuncture point: a point of the body where an acupuncture needle may be inserted. Acupuncture points are identified by anatomical landmarks and palpation.

Acupoint: a shorthand way of referring to an acupuncture point.

Afferent nerve: a nerve that bring information from the body to the brain.

Anticholingeric: a substance that blocks the action of the neurotransmitter acetylcholine at synapses in the central and the peripheral nervous system. Medications used to treat symptoms of overactive bladder (OAB) include anticholinergic agents.

Augmentation cystoplasty: a procedure that involves making the bladder bigger by adding a piece of tissue from the intestine into the bladder wall. This may improve the ability of the bladder to store urine. It is rarely performed for symptoms of OAB and is viewed as a treatment of last resort.

Bladder brain control matrix: the complex nerve pathways governing bladder function.

Bladder retraining: the first-line treatment for urinary symptoms associated with OAB. It involves teaching the bladder to hold more urine and helps to reduce urinary frequency.

β3-adrenoreceptor agonists: a medication that relaxes smooth muscle and so can have a beneficial effect on OAB symptoms.

Comorbidities: the presence of one or more additional conditions co-occurring with a primary condition.

Dermatome: an area of sensory nerves near the skin that are supplied by a specific spinal nerve root. The body can be divided into regions that are mainly supplied by a single spinal nerve. Dermatomes are named according to their spinal nerve root.

Economic evaluation: the application of analytical methods to identify measure and value both the costs and benefits of alternative interventions in order to provide evidence regarding technical or allocative efficiency and aid decision making for resource allocation (definition taken from the Campbell and Cochrane Economics Methods Group's Glossary).

Efferent nerve: a nerve that brings information from the brain to the body.

Electroacupuncture: an acupuncture technique that applies small electrical currents to needles that have been inserted at specific points on the body.

Intravesical botulinum toxin injection: a form of treatment where botulinum toxin is injected into the smooth muscle of the bladder wall (the detrusor muscle) in order to treat symptoms of OAB.

Limbic system: interconnected structures in the midline of the brain involved with emotion, memory and regulatory systems.

Meridians: a concept in Traditional Chinese Medicine (TCM) about a path through which the life-energy known as "Qi" flows.

Nocturia: the number of times urine is passed during the main sleep period.

Overactive bladder(OAB): a group of symptoms affecting the urinary system that includes urinary urgency (a sudden and intense desire to pass urine that is hard to defer), frequency (passing urine more frequently than 5 to 8 times in a 24-hour period), nocturia (waking to pass urine at night), urinary incontinence (involuntary passing urine).

OAB-dry: OAB symptoms without urinary incontinence.

OAB-wet: OAB symptoms with urinary incontinence.

Orbitofrontal cortex: a region in the frontal lobes of the brain that is involved in the cognitive process of decision-making.

Prefrontal cortex: the anterior part of the frontal lobe of the brain, which is highly developed in humans and concerned with complex cognitive, emotional and behavioural functions.

Peri-aqueductal gray (PAG): a mid-brain structure that plays a critical role in autonomic function and behavioural responses to threatening stimuli.

Qi: believed to be a vital force forming part of any living entity in TCM.

Traditional Chinese Medicine(TCM): a system of medicine traditionally practised in China; acupuncture is one component of this system.

Sacral neuromodulation: a form of treatment where a small nerve stimulator device is implanted in the body to provide stimulation to the sacral nerves. This stimulation is thought to have an effect on the nerves passing between the bladder and the brain and relieve the symptoms of OAB.

Smooth muscle: a type of muscle tissue that contracts without conscious control. The detrusor muscle that forms the bladder wall is made of smooth muscle.

Urinary diversion: a procedure where the tubes that lead from the kidneys to the bladder (ureters) are redirected to outside of the body. The urine is then collected directly without it flowing into the bladder. Urinary diversion is only performed if other treatments have been unsuccessful or are unsuitable.

Urinary incontinence (UI): involuntary passing of urine.

Urothelial cells: the cells that form the lining of the bladder.

Appendix 2. Search of the Cochrane Incontinence Specialised Register for clinical effectiveness studies

The search terms used to search the Cochrane Incontinence Specialised Register are given below:

((design.cct*) OR (design.rct*))
AND
((topic.urine.incon*) OR (topic.urine.overactive*))
AND
(intvent.phys.acupuncture*)

All searches were of the keywords field of EndNote (EndNote 2018).

Appendix 3. Allied and Complementary Medicine Database (AMED) search terms

The search terms used to search the Allied and Complementary Medicine Database (AMED) on EBSCOhost are given below:

(overactive bladder OR overactive bladder syndrome OR urgency OR oab OR urinary incontinence OR sensitive bladder) AND (acupuncture OR acupuncture therapy OR acupuncture treatment OR electroacupuncture OR dry needling)

Appendix 4. Chinese database search terms

The search terms used to search the Chinese databases are given below:

Databases	Search terms	Search terms (Pinyin)
CNKI	SU=('膀胱过度活动'+'OAB'+'OAS'+'尿急综合征'+'尿频-尿急综合征'+'尿急'+'尿频'+'尿失禁') and SU=('针'+'针刺'+'耳针'+'头针'+'电针'+'经皮电刺激') and FT=('随机'+'半随机'+'交叉对照') and NOT TI=('动物'+'鼠'+'犬'+'兔'+'猴')	SU=('Pangguang Guodu Huodong'+'OAB'+'OAS'+'Niao-ji Zonghezheng'+'Niaopin-Niaoji Zonghezheng'+'Niao-ji'+'Niaopin'+'Niaoshijin') and SU=('Zhen'+'Zhen-ci'+'Erzhen'+'Touzhen'+'Dianzhen'+'Jingpi Dianciji') and FT=('Sui-ji'+'Ban Suiji'+'Jiaocha Duizhao') and NOT TI=('Dongwu'+'Shu'+'Quan'+'Tu'+'Hou')
WANFANG	主题:(膀胱过度活动症 or OAB or 膀胱过度活动综合征 or OAS or 尿急综合征or 尿频-尿急综合征) * 主题:(针刺 or 耳针 or 电针 or 头针or 经皮电针)* (随机 or 半随机 or 交叉对照)	Topic:(Pangguang Guodu Huodong Zheng or OAB or Pangguang Guodu Huodong Zonghezheng or OAS or Niaoji Zonghezheng or Niaopin-Niaoji Zonghezheng) * Topic:(Zhenci or Erzhen or Dianzhen or Touzhen or Jingpi Dianzhen)* (Suiji or Ban Suiji or Jiaocha Duizhao)
VIP	(M=膀胱过度活动症+M=OAB+M=膀胱过度活动综合征+M=OAS+M=尿急综合征+M=尿频-尿急综合征)*(M=针刺+M=耳针+M=头针+M=电针+M=经皮电刺激)*U=随机	(M=Pangguang Guodu Huodong Zheng+M=OAB+M=Pangguang Guodu Huodong Zonghezheng+M=OAS+M=Niaoji Zonghezheng+M=Niaopin-Niaoji Zonghezheng)*(M=Zhenci+M=Erzhen+M=Touzhen+M=Dianzhen+M=Jingpi Dianciji)*U=Suiji

Appendix 5. Search methods for the brief economic commentary (BEC)

We performed electronic searches designed to identify published reports of relevant economic evaluations to inform the brief economic commentary (BEC) (see 'Incorporating economic evidence' in the Methods).

We searched the Cochrane Incontinence Specialised Register of Economic Evaluations (EEs) which consists of searches of:

- NHS Economic Evaluation Database (EED) on the UK Centre for Reviews and Dissemination (CRD) website (covering from the earliest record in NHS EED, dating from 1968, up to and including 31 December 2014 when their coverage ended)

As NHS EED is no longer actively updated, we performed additional searches of the following databases to identify eligible studies added to these databases from 1 January 2015 onwards:

- MEDLINE on OvidSP (covering 1 January 1946 to June Week 5 2022); and
- Embase (on OvidSP) (covering 1 January 1974 to to 2022 Week 27).

The search terms used to search the Cochrane Incontinence Specialised Register of Economic Evaluations are given below:

((topic.urine.incon*) OR (topic.urine.overactive*))
AND

(intvent.phys.acupuncture*)

All searches were of the keywords field of EndNote (EndNote 2018).

The economic evaluation search filters applied to our MEDLINE and Embase search strategies were those formerly used by the CRD to identify published reports of full economic evaluations for indexing on NHS EED. These economic evaluation search filters remain freely available on the CRD Database web-pages (CRD 2015). The other search lines in the MEDLINE and Embase search strategies were adapted from the electronic search strategies run for our Cochrane Incontinence Specialised Register of clinical effectiveness studies related to urinary incontinence/overactive bladder. Similarly, our NHS EED search strategy was adapted from search strategies run for our Specialised Register and based on text word and MeSH terms (capturing relevant P-I-C concepts) used to identify eligible studies of intervention effects. We followed the current economic methods guidance (Aluko 2022).

The search for the Cochrane Incontinence Specialised Register of EEs was only current up to 20 October 2021 and so one of the review authors (AK) screened an updated search of MEDLINE and Embase (conducted on 11 July 2022) to bring the Specialised Register search for EEs up to date. The search strategies used in MEDLINE and Embase to populate the Cochrane Incontinence Specialised Register of EEs are given below. The original search of NHS EED to begin populating the Specialised Register of EEs is given at the end of this Appendix.

MEDLINE on OvidSP (covering 1 January 1946 to June Week 5 2022) was last searched on 11 July 2022

1.	Economics/
2.	exp "costs and cost analysis"/
3.	Economics, Dental/
4.	exp economics, hospital/
5.	Economics, Medical/
6.	Economics, Nursing/
7.	Economics, Pharmaceutical/
8.	(economic$ or cost or costs or costly or costing or price or prices or pricing or pharmacoeconomic$).ti,ab.
9.	(expenditure$ not energy).ti,ab.
10.	value for money.ti,ab.
11.	budget$.ti,ab.
12.	or/1-11
13.	((energy or oxygen) adj cost).ti,ab.
14.	(metabolic adj cost).ti,ab.
15.	((energy or oxygen) adj expenditure).ti,ab.
16.	or/13-15
17.	12 not 16
18.	letter.pt.
19.	editorial.pt.

(Continued)

20.	historical article.pt.
21.	or/18-20
22.	17 not 21
23.	exp animals/ not humans/
24.	22 not 23
25.	(incontinen$ or continen$).tw.
26.	exp urinary incontinence/
27.	nycturia.tw.
28.	((bladder or detrusor or vesic$) adj5 (instability or stab$ or unstable or irritab$ or hyperreflexia or dys?ynerg$ or dyskinesi$ or irritat$)).tw.
29.	(urin$ adj2 (leak$ or urge$ or frequen$)).tw.
30.	dribbl$.tw.
31.	bladder, neurogenic/
32.	((bladder or detrusor or vesic$) adj2 (hyper$ or overactiv$)).tw.
33.	(spinal adj2 bladder$).tw.
34.	(bladder$ adj2 (neuropath$ or neurogen$ or neurolog$)).tw.
35.	(nervous adj1 (pollakisur$ or pollakiur$)).tw.
36.	urinary bladder, overactive/
37.	exp enuresis/
38.	enure$.tw.
39.	bedwet$.tw.
40.	bed-wet$.tw.
41.	(bed adj5 wet$).tw.
42.	(diurnal adj5 wet$).tw.
43.	diurnal-wet$.tw.
44.	((daytime or day-time or nighttime or night-time or nightime) adj5 wet$).tw.
45.	(void$ adj2 dysfunct$).tw.
46.	((urin$ or bladder) adj5 sphincter$).tw.
47.	(urethra$ adj2 sphincter$).tw.

(Continued)

48.	(bladder adj2 neck).tw.
49.	(vesic$ adj1 (neck$ or cervi$)).tw.
50.	(detrusor adj1 sphincter$).tw.
51.	or/25-50
52.	24 and 51

Embase (on OvidSP) (covering 1 January 1974 to to 2022 Week 27) was last searched on 11 July 2022

1.	Health Economics/
2.	exp Economic Evaluation/
3.	exp Health Care Cost/
4.	pharmacoeconomics/
5.	(econom$ or cost or costs or costly or costing or price or prices or pricing or pharmacoeconomic$).ti,ab.
6.	(expenditure$ not energy).ti,ab.
7.	(value adj2 money).ti,ab.
8.	budget$.ti,ab.
9.	or/1-8
10.	letter.pt.
11.	editorial.pt.
12.	note.pt.
13.	or/10-12
14.	9 not 13
15.	(metabolic adj cost).ti,ab.
16.	((energy or oxygen) adj cost).ti,ab.
17.	((energy or oxygen) adj expenditure).ti,ab.
18.	15 or 16 or 17
19.	14 not 18
20.	animal/

(Continued)

21.	exp animal experiment/
22.	nonhuman/
23.	(rat or rats or mouse or mice or hamster or hamsters or animal or animals or dog or dogs or cat or cats or bovine or sheep).ti,ab,sh.
24.	20 or 21 or 22 or 23
25.	exp human/
26.	human experiment/
27.	25 or 26
28.	24 not (24 and 27)
29.	19 not 28
30.	conference abstract.pt.
31.	29 not 30
32.	incontinence/ or mixed incontinence/ or stress incontinence/ or urge incontinence/ or urine incontinence/
33.	continence/
34.	overactive bladder/
35.	micturition disorder/ or lower urinary tract symptom/ or pollakisuria/
36.	urinary dysfunction/ or bladder instability/ or detrusor dyssynergia/ or neurogenic bladder/ or urinary urgency/ or urine extravasation/
37.	(incontinen$ or continen$).tw.
38.	((bladder or detrusor or vesic$) adj5 (instab$ or stab$ or unstab$ or irritab$ or hyperreflexi$ or dys?ynerg$ or dyskinesi$ or irritat$)).tw.
39.	(urin$ adj2 leak$).tw.
40.	((bladder or detrusor or vesic$) adj2 (hyper$ or overactiv$)).tw.
41.	(bladder$ adj2 (neuropath$ or neurogen* or neurolog$)).tw.
42.	(nervous adj pollakisur$).tw.
43.	or/32-42
44.	31 and 43

NHS EED on CRD website was searched on 14 June 2019 (in all fields)

Line	Search
1	MeSH DESCRIPTOR pelvic floor EXPLODE ALL TREES IN NHSEED
2	MeSH DESCRIPTOR pelvic floor disorders EXPLODE ALL TREES IN NHSEED
3	MeSH DESCRIPTOR Urinary Bladder, Neurogenic EXPLODE ALL TREES IN NHSEED
4	MeSH DESCRIPTOR Urinary Bladder, overactive EXPLODE ALL TREES IN NHSEED
5	((incontinen*) OR (continen*)) IN NHSEED
6	((floor adj2 pelvi*) OR (pelvi* adj2 floor)) IN NHSEED
7	((nycturia)) IN NHSEED
8	(((urin* or bladder) adj5 sphincter*) OR (sphincter* adj5 (urin* or bladder))) IN NHSEED
9	(((bladder OR detrusor OR vesic*) ADJ5 (instability OR stab* OR unstable OR irritab* OR hyperreflex-ia OR dysynerg* OR dyskinesi* OR irritat*)) OR ((instability OR stab* OR unstable OR irritab* OR hyperreflexia OR dysynerg* OR dyskinesi* OR irritat*) ADJ5 (bladder OR detrusor OR vesic*))) IN NHSEED
10	((urethra* ADJ2 sphincter*) OR (sphincter* ADJ2 urethra*)) IN NHSEED
11	((bladder ADJ2 neck) OR (neck ADJ2 bladder)) IN NHSEED
12	((urin* ADJ2 (leak* OR urge* OR frequen*)) OR ((leak* OR urge* OR frequen*) ADJ2 urin*)) IN NHSEED
13	(dribbl*) IN NHSEED
14	((vesic* ADJ1 (neck* OR cervi*)) OR ((neck* OR cervi*) ADJ1 vesic*)) IN NHSEED
15	(((bladder OR detrusor OR vesic*) ADJ2 (hyper* OR overactiv*)) OR ((hyper* OR overactiv*) ADJ2 (bladder OR detrusor OR vesic*))) IN NHSEED
16	((detrusor ADJ1 sphincter*) OR (sphincter* ADJ1 detrusor)) IN NHSEED
17	((spinal ADJ2 bladder*) OR (bladder* ADJ2 spinal)) IN NHSEED
18	((bladder* ADJ2 (neuropath* OR neurogen* OR neurolog*)) OR ((neuropath* OR neurogen* OR neu-rolog*) ADJ2 bladder*)) IN NHSEED
19	((nervous ADJ1 (pollakisur* OR pollakiur*)) OR ((pollakisur* OR pollakiur*) ADJ1 nervous)) IN NHSEED
20	(MeSH DESCRIPTOR urinary incontinence EXPLODE ALL TREES) IN NHSEED
21	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20

Key: $ or * = truncation symbol; tw. = titles and abstracts; / = MeSH or Emtree term; exp = exploded MeSH or Emtree term; adj*n* = within *n* words, in any order on Ovid, in fixed order on CRD; ? character may or may not be present.

H I S T O R Y

Protocol first published: Issue 1, 2020

C O N T R I B U T I O N S   O F   A U T H O R S

EH: reference screening, data extraction, risk of bias assessment, data input and editing, wrote text of review and edited, liaison with Cochrane Incontinence and Covidence support team.
KB: review and editing of text, arbiter for data extraction.
GB: review and editing of text, arbiter for bias assessment and GRADE assessment.
CH: review and editing of text.
YYZ: searching of Chinese databases, reference screening, data extraction, risk of bias assessment, review and editing of text.
XWZ: searching of Chinese databases, reference screening, data extraction, risk of bias assessment, review and editing of text.
NBK: statistical advice and review.
CEC: reference screening, data extraction, risk of bias assessment, review and editing of text.

D E C L A R A T I O N S   O F   I N T E R E S T

In accordance with Cochrane's Commercial Sponsorship Policy, the following declarations are applicable for the three years prior to the publication date of this review.

EH: is a practising NHS physiotherapist (Newcastle upon Tyne Hospital NHS Foundation Trust) and uses acupuncture as one of a number of relevant interventions within their practice.
KB: none to declare.
GB: none to declare.
CH: is a subject matter specialist engaged with several parties including Medronic, Allergan, Astellas and Teleflex Medical, and is the guidelines panel chair for the European Association of Urology.
YYZ: none to declare.
NBK: none to declare.
XZ: none to declare.
CEC: provides acupuncture education courses, including a course on acupuncture for women's health that discusses overactive bladder treatment strategies.

S O U R C E S   O F   S U P P O R T

Internal sources

- No sources of support provided

External sources

- National Institute for Health Research (NIHR), UK

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- National Center for Complementary and Integrative Health (NCCIH), USA

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D I F F E R E N C E S   B E T W E E N   P R O T O C O L   A N D   R E V I E W

In the protocol we undertook to search five Chinese databases:

- China National Knowledge Infrastructure (CNKI);
- Chinese Medical Literature Database (CBM);
- Chinese Medical Current Content (CMCC);
- Chinese Science and Technology Periodical Database (VIP); and
- WANFANG (China Online Journals).

Following test search strategies it became clear that the CBM and CMCC produced duplicate searches to the three main Chinese language databases (CNKI, VIP and WANFANG), therefore the search strategy documented in Appendix 4 was used to conduct Chinese language searches and the methods section of the review was amended to reflect this.

Three included studies used a combined comparator as follows:

- Liu 2019: comparator combines medication and pelvic floor training;
- Hong 2015: comparator combines medication and bladder retraining;
- Yu 2012: comparator combines medication and bladder retraining.

Combinations of conservative interventions are used to treat overactive bladder and the combinations selected in these studies are reflective of common practice. In the protocol for this review, we chose to group conservative interventions (e.g. pelvic floor training, bladder retraining, lifestyle changes) and medication for overactive bladder as separate entities. Many clinicians would argue that they are all conservative treatments and as such can be combined for the purposes of this review. We have chosen to include these studies as they reflect treatment in a 'real world' setting.

INDEX TERMS

Medical Subject Headings (MeSH)

*Acupuncture Therapy [adverse effects] [methods]; *Nocturia; Salicylamides; *Urinary Bladder Diseases; *Urinary Bladder, Overactive [therapy]; *Urinary Incontinence [therapy]

MeSH check words

Adult; Humans