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# Electroacupuncture for Overactive Bladder: A Case Report

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***Abstract:*** *Overactive bladder (OAB) is one of the lower urinary tract symptoms (LUTS) characterized by urinary urgency. This disease has a huge impact on patients'lives and physical and mental health. The ideal treatment for OAB is still being explored. Electroacupuncture therapy of traditional Chinese medicine (TCM) has a remarkable effect in treating this disease. Among them, Baliao points have a certain efficacy but are difficult to operate. This article reports a case of electroacupuncture at Ciliao (Bl32) and new Baliao points in the treatment of OAB, with good efficacy and no recurrence after one year of follow-up, in order to provide new ideas for clinical treatment of this disease.*

***Keywords:*** *Electroacupuncture; Overactive bladder; case report*

## 1. Introduction

Overactive bladder(OAB) is a common disease in urology, and epidemiological studies have shown that the prevalence of the disease is 11.8% in Europe and the United States, and is slightly higher in female than in male (Figure 1) [1,2]. OAB describes the symptom complex of urinary urgency, usually accompanied by frequency and nocturia with or without urinary incontinence in the absence of pathologic or metabolic conditions that might explain these symptoms, as shown in Figure 2. The pathogenesis of OAB remains unclear in modern medicine. Current studies propose several theories for the pathogenesis of OAB, including myogenic dysfunction, neurogenic dysfunction, urothelial dysfunction, or decreased expression of a channel protein secondary to bladder outlet obstruction [3,4].

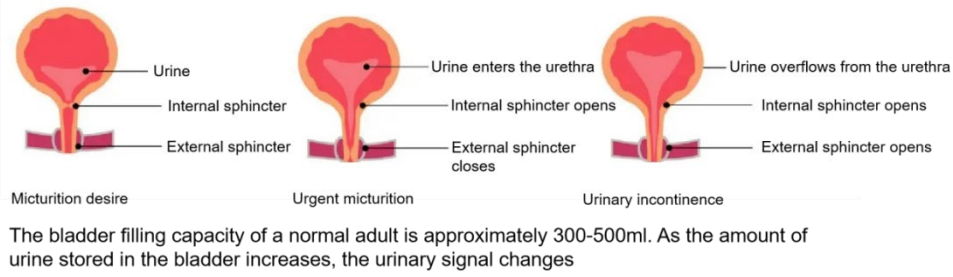


*Figure 1: Overactive bladder (OAB)*

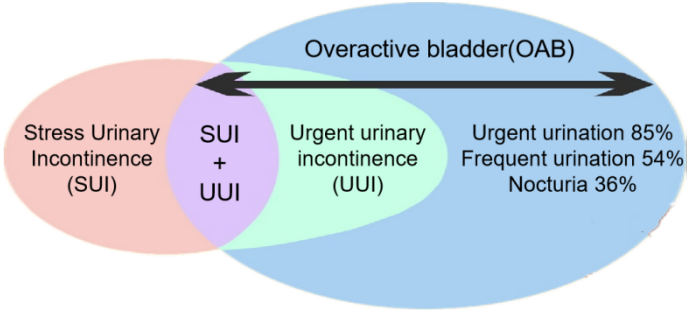


*Figure 2: Symptoms of OAB*

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The myogenic theory suggests that an increase in the number and excitability of Interstitial cells of Cajal (ICCs) in the bladder can enhance the activity of the urethral smooth muscle cells and produce the symptoms of OAB; there are cholinergic receptors M2 and M3 in the cells of ICCs of the urethral muscle. Cholinergic drugs can reduce the signal reception of the M2 and M3 receptors on the cells of the bladder by blocking their signal reception and reducing the spontaneous activity of the cells, thus improving the symptoms of OAB [5]. On the other hand, the neurogenic theory posits that abnormalities in the high-level micturition central inhibitory pathway, or the peripheral nerves disrupt the normal inhibitory mechanism coordinated by the thalamus, spinal cord, and peripheral nerves [6]. This disruption limits the output of descending inhibitory nerve impulses, resulting in continued activation of the detrusor muscle during the storage phase and leading to symptoms of OAB. Thus, neuromodulation and the use of peripheral nervous system drugs and central nervous system drugs can regulate bladder and urethra function by intervening in the neural pathways of the micturition reflex [7]. In addition, the bladder urothelium acts as a receptor and plays a role in integrating and transmitting sensory signals from the bladder. The urothelium receives information from the bladder contents and expresses various receptors, such as purinergic, nicotinic, and muscarinic receptors. When the bladder is mechanically, thermally, or chemically stimulated, these receptors release neurotransmitters that affect the excitability of afferent nerves and cause detrusor contraction. Damage to the urothelium due to changes in the external environment or bladder disease can increase afferent signals, leading to bladder hypersensitivity and detrusor contraction [8]. Other factors affecting OAB include metabolic syndrome, affective disorders, sex hormone deficiency, urinary tract microbiota, gastrointestinal dysfunction, and autonomic nervous system dysfunction.

Since the aetiology and pathogenesis of OAB are still unclear, current treatments focus on improving clinical symptoms, including behavioural therapy, medication, and invasive therapies [9]. The current treatment mainly focuses on behavioural therapy, combined with drug treatment, to achieve long-term, comprehensive treatment of chronic diseases. Behavioral therapy focuses on bladder training, pelvic floor muscle training, and lifestyle changes. It is currently the first-line treatment for OAB. Studies [10] have shown that long-term behavioral intervention can significantly improve the urinary function of OAB patients. However, these treatments are highly individualized and require Patients to invest a lot of time and energy, and the treatment cycle is long, requiring high patient compliance. Therefore, clinical behavioural treatment often needs to be combined with other treatments in order to ensure efficacy. The main pharmacological management for OAB is antimuscarinic drugs. However, due to the wide distribution of M receptors, blockers are not highly selective, so adverse reactions such as dry mouth and eyes, blurred vision, constipation, cognitive impairment, and increased intraocular pressure may occur with the use of antimuscarinic drugs [11]. β-adrenergic agonists are also widely used. They can act on β3-adrenergic receptors in bladder detrusor and urothelial cells, inducing bladder smooth muscle relaxation without affecting normal bladder emptying, increasing bladder capacity, which can effectively reduce the frequency of urination and improve frequent urination, urgency, and urinary incontinence caused by OAB [12].

For patients who do not show obvious improvement or cannot tolerate drug treatment, more invasive therapies such as intravesical Botulinum Toxin A, neuromodulation, and other therapies can be considered [13]. Neuromodulation is a minimally invasive treatment for OAB patients following failure of conventional interventions, including sacral neuromodulation (SNM), Percutaneous tibial nerve stimulation, and posterior tibial nerve stimulation. SNM is the most recommended treatment for refractory OAB of neuromodulation and has been proven to be a safe and effective treatment in the short, medium, and long term. A study shows none of the reviewed studies with SNM reported any life-threatening or irreversible complications [14]. SNM uses an implantable neurostimulator and electrodes positioned near the sacral nerves to regulate the nerve reflexes associated with OAB. By stimulating the sacral nerves, SNM helps restore balance to abnormal nerve reflexes of the bladder, sphincter, and pelvic floor. However, this type of treatment has the potential for displacement of the electrode pads, pain at the implantation site, and infection. A study with a follow-up period of at least 24 months showed high rates of surgical reintervention, with a median of 33.2% (range: 8-34%) [14].

Therefore, it is necessary to discover an effective and with minimal side effects. In clinical practice, electroacupuncture in the sacrocaudal region offers a minimal side effects flexible, and efficacy treatment approach without the need to bear the risk of surgical intervention [15-17]. A review shows there are limited but positive data regarding menopause-related overactive bladder [18]. Another review published in 2022 provides 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 [16]. This article presents a case in which electroacupuncture stimulation of BL32 and new Baliao points was employed to successfully treat OAB, resulting in

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significant efficacy and no recurrence after a year of follow-up.

## 2. Cases

The patient was a 25-year-old female who developed symptoms of frequent urination, urgent urination, and urge urinary incontinence in January 2021. She was treated in several hospitals in Xi'an and was diagnosed with OAB. The patient's symptoms were not significantly relieved after taking muscarinic receptor antagonists. Therefore, the patient was diagnosed with refractory OAB, and recommended that she undergo SNM. Considering the cost of surgery and the risk of reoperation, the patient refused to undergo this treatment.

Accordingly, the patient came to our department to undergo TCM-based therapy on July 17, 2021. Her complaints included a 7-month history of frequent urination (23–30 times/day), urgent urination (6-9 times/day). An auxiliary examination showed negative results for the urine analysis. Bladder ultrasound revealed 10 ml of residual urine. We diagnosed her with OAB. Then the patient underwent TCM-based therapy including electroacupuncture stimulation of sacrococcygeal acupoints.

### *2.1. Treatment methods*

Acupoint prescription: Ciliao(BL32) and six acupoints of new Baliao points, which were located near the upper region. The New Baliao points consist of a total of 8 acupoints, with 4 acupoints on each side. These acupoints are located next to the coccyx and sacrum, forming an inverted figure eight shape. The first acupoint is situated approximately 1.5cm below the tailbone and about 0.8cm beside the posterior midline; the second acupoint is located approximately 1.5cm above the first acupoint and about 1.5cm beside the coccyx; the third acupoint lies on the line connecting the first two acupoints, slightly upward and extends 1.5cm laterally. The fourth acupoint extends upward and slightly 1.5cm laterally, level with the fourth posterior sacral foramen, about 2.8cm beside the posterior midline, as shown in Figure 3.

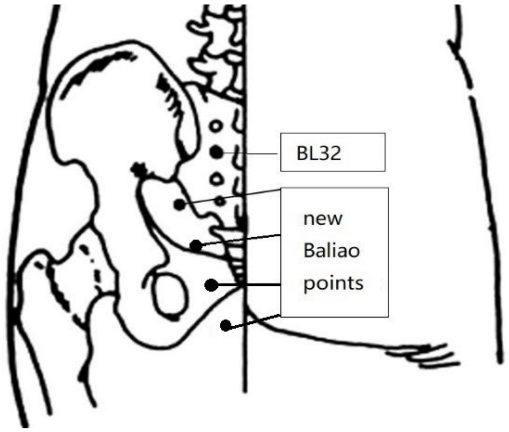


*Figure 3: Locations of BL 32 and new Baliao points*

The operation process: Before the acupuncture, the patient was instructed to urinate and defecate. The doctor disinfects their hands using alcohol cotton balls. With the patient lying prone, the skin was disinfected with 75% alcohol before disposable stainless steel needles (0.25 mm × 75 mm, Hwato, Suzhou, China) were inserted to a depth of 50-75 mm at BL32 and the six lower points in the the new Baliao pointss. Oblique insertions were used at BL32. Other acupoints insertions were perpendicular, with the needle tip facing the bladder. All the needles broke the skin quickly and then entered slowly. The sensation of tightness under the needle indicated Deqi. The cable from the electroacupuncture therapeutic apparatus ( SDZ-IIB, Hwato, Suzhou, China ) connected to the acupuncture needle of the uppermost and lowermost acupoints on both sides(BL32 and the lowermost acupoint of the new Baliao points), as shown in Figure 4. A continuous wave with a frequency of 30 Hz was used, and the intensity was adjusted to a level that the patient found bearable. The needle is left in place for 30 minutes. Patients received 2 treatments per week, with each course of treatment consisting of ten sessions. A total of 5 courses of treatment were administered. OAB symptom score (OABSS) was evaluated at the end of each course of treatment.

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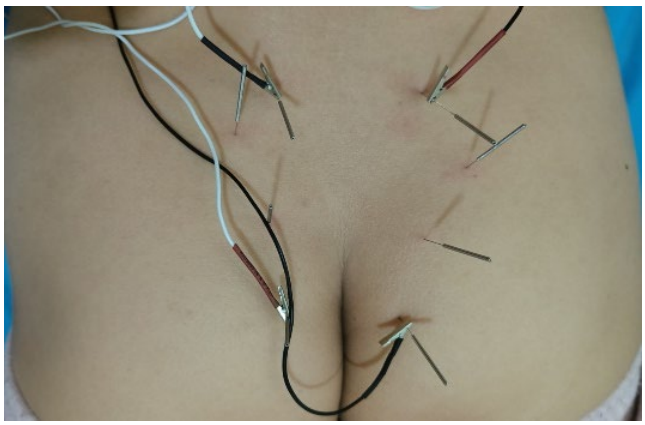

*Figure 4: After the acupuncture, the cable from the electroacupuncture therapeutic apparatus connected to the acupuncture needle of the uppermost and lowermost acupoints on both sides*

### *2.2. Clinical outcome*

After 5 courses of acupuncture treatment, the patient's symptoms of frequent urination improved without urinary urgency, and the average number of urination was 6-7 times per day, of which about 4-6 times during the day and 1 time at night, so the treatment was discontinued. Figure 5 documents the results of OABSS scores for each course during the patient's treatment. After 1 year, the patient was followed up by telephone, and the symptoms did not recur.

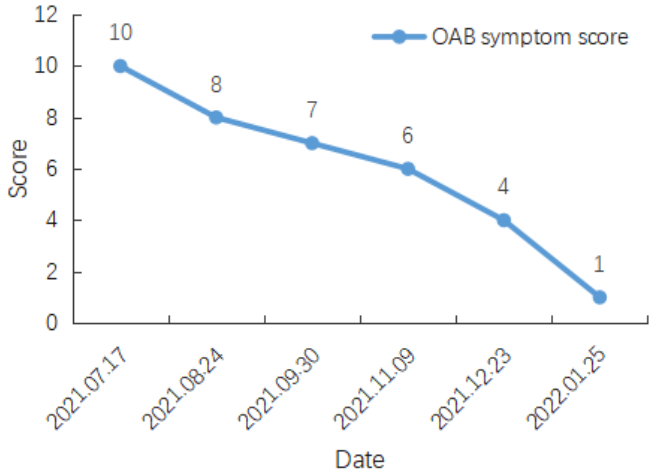


*Figure 5: Trends in the patient's OAB symptom score (OABSS) scores for each course during the patient's treatment*

## 3. Comment

The bladder serves the purpose of storing and expelling urine. Normal urination in the human body occurs through the intact bladder wall and nerve reflex pathways. The bladder's nerve reflexes are innervated by three pairs of nerve fibers (Figure 6): the sympathetic (hypogastric nerve) and parasympathetic (pelvic splanchnic nerve) afferent and efferent nerves, as well as the peripheral somatic nerve (pudendal nerve). The sympathetic nervous system (hypogastric nerve) strengthens the internal urethral sphincter (bladder sphincter) and relaxes the bladder detrusor during urine storage. The parasympathetic nervous system (pelvic splanchnic nerves), originating from the S2-S4 sacral nerves, contracts the detrusor muscle and relaxes the internal urethral sphincter during urination. Most afferent fibres from the bladder enter the sacral medulla primarily via the pelvic nerve. The peripheral nerve of the body (pudendal nerve) innervates the external urethral sphincter and the striated muscles of the perineum and is responsible for the tonic contraction of the external urethral sphincter. The bladder detrusor and internal urethral sphincter receive dual innervation from sympathetic and parasympathetic nerves, while the external urethral sphincter receives innervation from the pudendal nerve [19]. These

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nerves, which have an impact on bladder function, primarily originate from the S2-S4 nerve segments and are distributed in the pelvis and next to the sacrococcygeal bone.

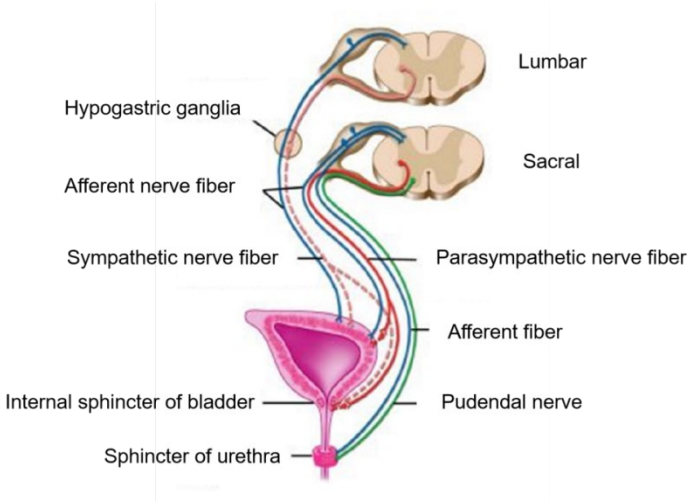


*Figure 6: Schematic diagram of bladder innervation*

Baliao points consist of bilateral Shangliao (BL31), Ciliao (BL32), Zhongliao (BL33), and Xialiao (BL34), which belong to the Bladder Meridian of Foot Taiyang in TMC. These points correspond to the first, second, third, and fourth posterior sacral foramen, respectively, in which there is sacral nerve penetration [20]. Acupuncture at Baliao points can directly stimulate the sacral nerves to treat urinary and reproductive system diseases [21-23]. Various positioning methods are commonly used in clinical practice for acupuncture at Baliao points, including bony landmark positioning, anatomical measurement positioning, ruler positioning, coordinates, regression equation positioning, bone degree positioning, and anatomical positioning combined with nerve response. As we know, stabbing into the sacral foramen is the key to the therapeutic effect that can be achieved by needling the Bachiao point. However, due to the thick soft tissue covering the posterior sacral foramen, the physiological curvature of the sacrum, and other factors, there are significant individual differences in the acupoints of different patients, making acupoint positioning and acupuncture angle more challenging. This requires acupuncturists to have high operational skills, resulting in some difficulty in clinical application. As illustrated by 1 case [24], the appearance of needle handles on the skin surface was indistinguishable between the case where the needles missed the sacral foramina and the case where the needles entered the foramina; and the patient also experienced the sensation of soreness and swelling even when the needle did not actually enter the sacral foramen. The new Baliao points are improved acupoints based on the Baliao points, which are easy to locate and simple to operate. The six acupoints we choose to lean on in the new Bachiao point are all located next to the sacrococcygeal bone. Deep within these acupoints are pelvic splanchnic nerves, pudendal nerves, and hypogastric nerves [25]. These nerves can be directly stimulated, along with the surrounding soft tissues, to influence bladder urination and produce functional effects.

Electroacupuncture, a therapeutic technique that involves connecting micropulse current to the needle of acupuncture, utilizes a continuous wave with a frequency of 30 Hz. This frequency falls between high and low frequencies, categorizing it as medium frequency. By combining the effects of both high and low frequencies, electroacupuncture can effectively regulate muscle contraction in tissues and blood vessels, leading to improved local blood circulation and promoting neuromuscular recovery, inhibit both sensory and motor nerves. Current research on the mechanism of electroacupuncture for treating OAB mainly focuses on peripheral nerve mechanisms and central nervous system mechanisms. Lu Junyan [26] treated rat model of suprasacral spinal cord injury (SCI) with electroacupuncture at BL32, significantly reduced inflammation and edema of bladder tissue sections, significantly reduced histomorphological abnormalities in ICCs and inhibited the expression of hyperpolarization-activated cyclic nucleotide-gated channel proteins after SCI. Electroacupuncture can enhance autophagic flow, promote neuronal regeneration, axonal and myelin remodeling to achieve the protection of spinal cord injury, can activate autophagy through the AMPK/mTOR pathway, thereby reducing neurogenic urine retention caused by spinal cord injury [27]. Feng Qifan et al. [28] used electroacupuncture at BL32 and BL35, which can significantly reduce the number of positive P2X3 cells in OAB of rats, spinal cord (L6-S1), and DRG (L6-S1) and can significantly reduce the number of positive P2X3 cells in OAB of rats. This results in a weakening of bladder sensory signals to the center

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and regulates bladder excitability [28]. It has been shown that electroacupuncture can affect in up-regulating Epac2 and Rap, activating the Raf-MEK-ERK pathway, reducing the cell apoptosis of spinal cord tissue, and can improve the bladder function in detrusor hyperreflexia rats after suprasacral spinal cord injury by observing urodynamics [29].

The principle of sacrococcygeal electroacupuncture for OAB is similar to that of SNM in that both stimulate the nerves in the sacrococcygeal region that have an effect on bladder function. Electroacupuncture also affects local soft tissues like muscles and fascia, providing a holistic regulation of bladder function. Electroacupuncture is considered simpler, more flexible, and easier to master compared to SNM from the doctor's perspective. From the patient's point of view, electroacupuncture is less traumatic, with fewer contraindications, no prolonged foreign body implantation, high psychological acceptance, and affordability. However, the selection of acupuncture points in electroacupuncture can vary, leading to different therapeutic effects and varying levels of operational difficulty. Our acupuncture point selection program offers easy operation and significant therapeutic effects. In clinical application, other points can be selected based on specific symptoms. The new Baliao points are closer to the rectum, and the bladder is located deeper in this area. When the rectum contains a large amount of stool, its diameter increases, and the speed of rectal evasion is reduced posing a risk of organ injury during needling of the new Baliao points. Therefore, it is important to instruct the patient to urinate and defecate before the operation to prevent any harm to the organ.

## 4. Summary

Our observations suggest that sacrococcygeal electroacupuncture may be a potential alternative treatment for OAB. It has shown promising results in reducing OAB scores. However, this is a single, uncontrolled case report, and therefore no definitive conclusions can be made. To accurately assess the effectiveness of electroacupuncture and understand its mechanism of action in treating OAB, a prospective randomized controlled trial with a sufficiently large sample size is necessary.

## References

*[1] Coyne Karin S, Sexton Chris C, Thompson Christine L, et al. The prevalence of lower urinary tract symptoms (LUTS) in the USA, the UK and Sweden: results from the Epidemiology of LUTS (EpiLUTS) study [J]. BJU international, 2009, 104(3):352-360.*

*[2] Debra E. Irwin, Ian Milsom, Steinar Hunskaar, et al. Population-Based Survey of Urinary Incontinence, Overactive Bladder, and Other Lower Urinary Tract Symptoms in Five Countries: Results of the EPIC Study [J]. European Urology, 2006, 50(6):1306-1315.*

*[3] Jiang Yuanhong, Kuo Hannchorng. Current optimal pharmacologic therapies for Overactive bladder [J]. Expert opinion on pharmacotherapy, 2023: 1-15.*

*[4] Babin Caroline P, Catalano Nicole T, Yancey David M, et al. Update on Overactive Bladder Therapeutic Options [J]. American journal of therapeutics, 2023.*

*[5] Joseph Silvia, Maria Steffi A, Peedicayil Jacob, et al. Drugs Currently Undergoing Preclinical or Clinical Trials for the Treatment of Overactive Bladder: A Review [J]. Current Therapeutic Research, 2022, 96:100669-100669.*

*[6] Arndt van Ophoven, Stefan Engelberg, Helen Lilley, et al. Systematic Literature Review and Meta-Analysis of Sacral Neuromodulation (SNM) in Patients with Neurogenic Lower Urinary Tract Dysfunction (nLUTD): Over 20 Years' Experience and Future Directions [J]. Advances in Therapy, 2021, 38(4):1987-2006.*

*[7] Feloney MP, Stauss K, Leslie SW. Sacral Neuromodulation [M]. Treasure Island (FL): StatPearls Publishing, 2022, PMID: 33620828.*

*[8] Benoit Peyronnet, Emma Mironska, Christopher Chapple, et al. A Comprehensive Review of Overactive Bladder Pathophysiology: On the Way to Tailored Treatment [J]. European Urology, 2019, 75(6):988-1000.*

*[9] Bhide Alka A, Tailor Visha, Fernando Ruwan, et al. Posterior tibial nerve stimulation for overactive bladder-techniques and efficacy [J]. International urogynecology journal, 2020, 31(5): 865-870.*

*[10] Jin Zhaofeng, Zhang Qiumin, Yu Yanlan, et al. Progress in overactive bladder: novel avenues from psychology to clinical opinions [J]. PeerJ, 2023, 11:e16112-e16112.*

*[11] Welk Blayne, Richardson Kathryn, Panicker Jalesh N, et al. The cognitive effect of anticholinergics for patients with overactive bladder.[J]. Nature reviews. Urology, 2021, 18(11):*

ISSN 2616-5791 Vol.4, Issue 11: 109-115, DOI: 10.25236/AJMHS.2023.041115

*686-700.*
*[12] Milano Serena, Maqoud Fatima, Rutigliano Monica, et al. β3 Adrenergic Receptor Agonist Mirabegron Increases AQP2 and NKCC2 Urinary Excretion in OAB Patients: A Pleiotropic Effect of Interest for Patients with X-Linked Nephrogenic Diabetes Insipidus [J]. International Journal of Molecular Sciences, 2023, 24(2):1136-1136.*
*[13] Chen Lichen, Kuo Hannchorng. Pathophysiology of refractory overactive bladder [J]. Lower urinary tract symptoms, 2019, 11(4):177-181.*
*[14] Tilborghs Sam, De Wachter Stefan. Sacral neuromodulation for the treatment of overactive bladder: systematic review and future prospects [J]. Expert review of medical devices, 2022, 19(2): 161-187.*
*[15] Muchtar Newanda Johni, Helianthi Dwi Rachma, Nareswari Irma, et al. Effectiveness of Electroacupuncture for Management of Young Patients with Overactive Bladder at 1-Year Follow-Up [J]. Medical acupuncture, 2021, 33(2):169-174.*
*[16] Hargreaves Emma, Baker Katherine, Barry Gill, et al. Acupuncture for treating overactive bladder in adults [J]. The Cochrane database of systematic reviews, 2022, 9:CD013519-CD013519.*
*[17] Xiong Chao, Tang Yuan, Shi Ruting, et al. Therapeutic effect of myofascial trigger point electroacupuncture technology on the treatment of overactive bladder syndrome in female [J]. Zhong nan da xue xue bao. Yi xue ban = Journal of Central South University. Medical sciences, 2020, 45(2): 155-159.*
*[18] Bishop Katherine C, Ford Anne C, Kuller Jeffrey A, et al. Acupuncture in Obstetrics and Gynecology [J]. Obstetrical & gynecological survey, 2019, 74(4):241-251.*
*[19] Manuela Tutolo, Enrico Ammirati, Frank Van der Aa, et al. What is New in Neuromodulation for Overactive Bladder? [J]. European Urology Focus, 2018, 4(1):49-53.*
*[20] Jin Xun, Guan Yanting, Bai Hua, et al. Effects of sEA on Slow Transit Constipation through the Microbiota-Gut-Brain Axis in Rats [J]. Evidence-Based Complementary and Alternative Medicine, 2020, 2020: 1-13.*
*[21] Zhao Yuwei, Zhou Jing, Mo Qian, et al. Acupuncture for adults with overactive bladder: A systematic review and meta-analysis of randomized controlled trials [J]. Medicine, 2018, 97(8):e9838.*
*[22] Yang Likun, Wang Yang, Mo Qian, et al. A comparative study of electroacupuncture at Zhongliao (BL33) and other acupoints for overactive bladder symptoms [J]. Frontiers of medicine, 2017, 11(1): 129-136.*
*[23] Yuan Hongwei, Wei Na, Li Yanfeng, et al. Effect of Depth of Electroacupuncture on the IPSS of Patients with Benign Prostatic Hyperplasia [J]. Evidence-based complementary and alternative medicine: eCAM, 2019, 2019:1439141.*
*[24] Shen Jianwu, Luo Ran, Zhang Lu, et al. Using electroacupuncture with optimized acupoint positioning to predict the efficacy of sacral neuromodulation of refractory overactive bladder: A case report [J]. Medicine, 2019, 98(45):e17795.*
*[25] Han Xuke, Gao Yang, Wang Shengju, et al. Effect of electroacupuncture on diabetic neurogenic bladder: A randomized controlled trial protocol [J]. Medicine, 2020, 99(17):e19843.*
*[26] Lu Junyan, Ying Xinwang, Chen Xiaolong, et al. Effects of electroacupuncture at different acupoints on the histomorphology of neurogenic bladder and the expression of hyperpolarization -activated cyclic nucleotide-gated channels in interstitial cells of Cajal in a rat model of suprasacral spinal cord injury [J]. Annals of palliative medicine, 2020, 9(6):3830-3838.*
*[27] Li Zhengfei, Zhang Ren, Zhao Guorui, et al. Electroacupuncture in the treatment of neurogenic urine retention through autophagy mediated by AMPK/mTOR pathway [J]. Journal of Central South University:Medical Science, 2022, 47(4):488-496.*
*[28] Feng Qifan, Zhang Andong, Xing Man, et al. Electroacupuncture Alleviates Bladder Overactivity via Inhabiting Bladder P2X3 Receptor [J]. Evidence-based complementary and alternative medicine: eCAM, 2020, 2020:4080891.*
*[29] Xu Ming, Ai Kun, Deng ShiFeng, et al. Effect of electroacupuncture on urodynamics and Raf/MEK/ERK signaling pathway in spinal cord tissue of rats with detrusor hyperreflexia after suprasacral spinal cord injury [J]. Acupuncture Research, 2023, 48(10):977-985.*