Biomedical Data Science
2026, VOL. 6, NO. 1, 147-151
DOI: 10.47297/wspbdsWSP2752-630533.20260601

Research Progress on Traditional Chinese Medicine Treatment for Recurrent Urinary Tract Infections in Elderly Patients

Qing Wang[1], Qin Li[2]

[1]Qinghai University, Xining, Qinghai, 810000, China

[2]Qinghai Provincial Hospital of Traditional Chinese Medicine, Xining, Qinghai, 810000, China

ABSTRACT

Recurrent urinary tract infection (RUTI) is one of the most common infectious diseases in the elderly, often accompanied by repeated antibiotic exposure, decreased quality of life, increased healthcare resource consumption, and growing challenges in long-term prevention. Particularly in postmenopausal women and elderly patients with comorbidities such as diabetes, neurogenic bladder, urinary retention, or debilitated status, recurrent infections are frequently driven by multiple factors including mucosal aging, impaired local defense mechanisms, microbial imbalance, and repeated pathogen colonization. Current treatment primarily relies on antimicrobial agents, but the efficacy of repeated or prolonged antibiotic use is often limited by post-discontinuation recurrence, adverse drug reactions, and increasing resistance. Traditional Chinese medicine (TCM) has accumulated extensive theoretical knowledge and practical experience in the treatment of recurrent urinary tract diseases, emphasizing syndrome differentiation and treatment, addressing both symptoms and root causes, and individualized long-term management. Available evidence suggests that TCM, either used alone or in combination with conventional anti-infective therapy, may help reduce recurrence rates, improve lower urinary tract symptoms, alleviate inflammatory burden, and enhance quality of life in some patients. However, current studies still face limitations in sample size, methodological quality, diagnostic criteria, and consistency of outcome measures. Future research should strengthen multicenter randomized controlled trials, evidence-based evaluations, and translational mechanism studies to provide more reliable evidence for the clinical application and international dissemination of TCM in elderly patients with recurrent urinary tract infections.

KEYWORDS

Traditional Chinese medicine; Recurrent urinary tract infection; Elderly patients; Syndrome differentiation and treatment; Research progress

1 Introduction

Recurrent urinary tract infections (UTIS) are typically defined as having at least two symptomatic episodes within 6 months or at least three symptomatic episodes within 1 year. Due to postmenopausal endocrine changes, impaired bladder emptying function, increased chronic disease burden, and repeated medical exposure, this condition has become increasingly common in elderly populations [1]. Recent Chinese literature reviews further indicate that recurrent infections are not merely microbiological events but represent chronic clinical issues involving persistent symptoms, repeated treatment discontinuation, increased psychological stress, and decreased quality of life [2]. Contemporary Traditional Chinese Medicine (TCM) literature categorizes recurrent UTIs primarily under the "Ling Syndrome" framework, particularly closely associated with "exhaustive luring syndrome." The prolonged recurrence in elderly patients is often interpreted as a pathological state characterized by spleen-kidney deficiency coexisting with damp-heat, toxic pathogens, and blood stasis [3]. This theoretical framework differs from modern biomedical pathogen-centered models but provides a relatively stable theoretical basis for staged treatment, constitution regulation, and recurrence prevention after symptom control.

Current clinical management remains highly dependent on antibiotics, urine culture, correction of anatomical or functional abnormalities, and risk factor management. The Chinese Expert Consensus on Urinary Tract Infections emphasizes accurate etiological assessment, rational selection of antimicrobial agents, and individualized management for special populations [4]. Meanwhile, advances in microbiological research indicate that bacterial virulence, biofilm formation, host inflammatory responses, and mucosal defense failure collectively contribute to recurrence and increased treatment difficulty [5]. These factors partially explain why elderly patients often require comprehensive strategies beyond short-term anti-infective therapy. Although most existing studies have included female participants, particularly postmenopausal or community-dwelling elderly women, current evidence is more robust in this subgroup. However, the conceptual framework and therapeutic implications remain relevant for broader populations of elderly patients with recurrent lower urinary tract infections.

2 Traditional Chinese Medicine Perspectives on Recurrent Urinary Tract Infections in Elderly Patients

In elderly populations, recurrent infections are closely associated with declining estrogen levels, perineal microbiota imbalance, diabetes mellitus, bladder outlet dysfunction, incomplete voiding, constipation, and reduced immune

elasticity. A clinical observation study involving elderly women demonstrated that adjunctive use of Polyporus Decoction (Zhuling Tang) on antibiotic therapy could alleviate symptoms and reduce adverse reactions, indirectly highlighting the therapeutic complexity in this population and the potential value of "combined regulation therapy" compared to pathogen eradication alone [6]. Recent community-based studies also suggest that integrated non-pharmacological Traditional Chinese Medicine (TCM) interventions may be particularly suitable for elderly patients, as they can address chronic discomfort, tendencies toward deficiency-cold constitution, and challenges in daily treatment adherence simultaneously [7].

Another significant clinical feature is that many elderly patients do not present with a single acute infection episode, but rather exhibit chronic fluctuating symptoms such as urinary frequency, urgency, dysuria, perineal discomfort, fatigue, poor sleep quality, and anxiety about recurrence. In clinical practice, these symptoms often persist even after improvement in urinary leukocyte counts. Therefore, a treatment model that integrates symptom relief, constitutional regulation, and recurrence prevention holds particular appeal in geriatric medicine. This clinical demand also constitutes one of the key reasons for the sustained attention to traditional Chinese medicine (TCM) therapeutic approaches in recent years. Furthermore, treatment decisions for elderly patients often become complicated by the overlap between symptomatic infections and age-related urinary symptoms, such as nocturia, urge incontinence, weakened pelvic floor function, or detrusor muscle hypotonia. Therefore, distinguishing between true "recurrent infections" and persistent lower urinary tract dysfunction is crucial. This practical challenge also explains why some elderly patients fail to achieve satisfactory long-term outcomes despite multiple rounds of antimicrobial therapy. In this context, Traditional Chinese Medicine (TCM) clinics often reassess patients' overall symptom profiles, including appetite, bowel movements, sleep patterns, thermal preferences, fatigue levels, and emotional stress, thereby expanding treatment objectives from mere infection control to restoring systemic balance and improving lower urinary tract comfort.

Most traditional Chinese medicine scholars believe that recurrent urinary tract infections in the elderly fall under the syndrome of "deficiency of the root and excess of the branch." The root deficiency primarily involves spleen and kidney deficiency, while the branch excess often manifests as damp-heat, toxic pathogens, blood stasis, and retention of pathogenic factors in the bladder and lower jiao. A doctoral dissertation on the "Qi-tonifying and kidney-nourishing method for relieving dysuria" in treating recurrent urinary tract infections in elderly women with kidney deficiency and damp-heat syndrome emphasizes that syndrome differentiation-based treatment combining tonification and pathogen elimination is clinically feasible [8]. Another doctoral dissertation on fumigation and washing therapy with Qinglin Formula for recurrent urinary tract infections in women similarly supports this view: local damp-heat can be addressed while simultaneously regulating constitutional weakness [9]. Studies on specific patterns of recurrent lower urinary tract infections further support the aforementioned pathogenesis model. Zhang Fujie's clinical research on Tonglin Huayu Formula for treating recurrent lower urinary tract infections with heat-stasis syndrome indicates that recurrent diseases are not merely caused by prolonged damp-heat retention, but may also involve collateral vessel obstruction and internal blood stasis after repeated episodes [10]. This understanding holds significant clinical implications for elderly patients, as prolonged disease courses, multiple medications, and underlying frailty often lead to complex interplay of deficiency, inflammation, and microcirculatory disturbances. Therefore, therapeutic approaches such as qi-tonifying and kidney-nourishing, heat-clearing and diuresis-promoting, blood-activating and stasis-resolving, as well as reinforcing vital qi and consolidating the foundation, should be combined rather than applied in isolation.

3 Research Progress on Internal Treatment Methods

3.1 Syndrome-based Treatment for Elderly Patients

Recent studies have specifically investigated the treatment of recurrent urinary tract infections in elderly women from the perspective of spleen-kidney theory, proposing that impaired qi transformation, kidney qi failure in retaining lower orifices, and residual damp-heat collectively constitute the core mechanism of recurrent infections in this age group [11]. Based on this understanding, clinical practice often involves modified applications of herbal formulas aimed at replenishing qi, warming kidney yang, nourishing kidney yin, eliminating dampness, and promoting diuresis. Many studies indicate that the primary therapeutic objectives extend beyond alleviating acute symptoms to restoring the body's resistance to reinfection during recovery periods.This age-specific understanding also helps explain why the same antimicrobial therapy produces different long-term outcomes in young and elderly patients. In older individuals, physical decline, impaired local circulation, and recurrent inflammatory damage often delay the recovery of bladder mucosal and lower urinary tract function. Traditional Chinese Medicine (TCM) syndrome differentiation and treatment attempts to address this complex scenario by distinguishing between different pathological states such as predominant deficiency syndrome, lingering damp-heat, involvement of blood stasis, or mixed deficiency-excess patterns. This approach integrates long-term prevention into treatment protocols rather than treating it as a post-event remedial measure.

3.2 Expertise of Renowned Physicians and Application of Empirical Formulas

Professor Huang Wenzheng's experience in treating recurrent urinary tract infections emphasizes the need for meticulous differentiation between acute exacerbations and remission phases, flexible adjustments between pathogen elimination and body tonification, and attention to the long-term disease course prone to recurrence [12]. Sun Luying's clinical experience in managing recurrent urinary tract infections also reflects similar principles, highlighting the importance of strengthening spleen and kidney function, avoiding excessive bitter-cold therapies during damp-heat treatment, and continuing consolidation therapy after symptom relief to reduce recurrence rates [13]. Although such empirical studies are not randomized controlled trials, their value lies in summarizing how experienced clinicians implement individualized treatments based on disease duration, constitutional differences, and recurrence patterns.From the perspective of geriatric medicine, these empirical approaches hold particular practical significance. Elderly patients often exhibit characteristics such as reduced digestive tolerance, coexistence of multiple chronic diseases, and heightened sensitivity to adverse reactions. Consequently, experienced clinicians typically avoid overly aggressive therapeutic agents and prefer a balanced strategy that combines cleansing and tonifying effects while maintaining harmonious coordination. This pragmatic approach aligns with modern geriatric medicine's emphasis on sustained tolerance and functional improvement rather than solely pursuing short-term intensive interventions.

3.3 Clinical Research on Integrated Traditional Chinese and Western Medicine and Prescription Formulations

Comparative clinical studies have gradually moved beyond simple empirical summaries. A 2024 study on Fuzheng Tonglin Powder for treating recurrent urinary tract infections with spleen-kidney deficiency and internal damp-heat accumulation demonstrated that both traditional Chinese medicine (TCM) monotherapy and integrated Chinese-Western medicine therapies could improve symptoms, urine parameters, and outcomes related to recurrence, with the combined regimen showing more pronounced overall benefits [14]. Such research holds significant importance as it advances the field from descriptive experience to comparative clinical evaluation, suggesting that TCM can serve as an adjunctive strategy to enhance therapeutic efficacy while potentially reducing recurrent antibiotic exposure dependence.

In addition to individualized decoctions, combinations of classical formulas or modified prescriptions continue to attract attention. For instance, Huanglian Jiedu Decoction combined with Bazheng Powder has been reported to enhance therapeutic efficacy in urinary tract infections and reduce inflammatory activity [15]. Although such studies are not strictly limited to elderly patients or recurrent cases, they indirectly support the potential of herbal interventions in traditional Chinese medicine for clearing heat and dampness, anti-inflammatory effects, and symptom relief. In the context of elderly patients, these findings further reinforce the perspective that integrated traditional Chinese and Western medicine approaches may be particularly useful when rapid symptom control and infection management are required during acute exacerbations.

4 Research Progress on External Treatment Methods

External treatment methods hold a significant position in Traditional Chinese Medicine (TCM) for managing chronic and recurrent diseases, as they may help alleviate symptoms, improve treatment adherence, and reduce gastrointestinal burden caused by long-term oral medication. Early reports indicated that acupuncture therapy for urinary tract infections (UTIS) could achieve certain positive outcomes, suggesting that relatively simple non-pharmacological interventions can also regulate lower-jiao qi transformation and improve symptoms [16]. Subsequent studies on acupuncture combined with self-formulated Tonglin Decoction for chronic UTIS further demonstrated that integrated internal and external therapies may enhance clinical improvement outcomes in recurrent cases [17].

In recent years, community-based interventions have gained increasing attention as many elderly women are not managed long-term in tertiary hospitals. The combination of Lei Huo Moxibustion and Yishen Tonglin Formula has been reported to improve symptoms and relapse-related outcomes in elderly women in community settings. This research direction holds practical significance for geriatrics, as it suggests a long-term management model that integrates symptom control, constitution regulation, and convenient follow-up. It also reflects a shift in therapeutic approaches from hospital-centered acute management to continuous preventive care for chronic recurrent diseases.

5 Advances in Mechanism of Action Research

Currently, research on the mechanisms of Traditional Chinese Medicine (TCM) in treating urinary tract infections (UTIS) remains less mature than clinical observations, but several directions are gradually emerging. An experimental study

demonstrated that Fuzheng Qingre Tonglin Formula can modulate the NLRP3 inflammatory small body pathway in rats with complicated UTIS, suggesting its potential anti-inflammatory and tissue-protective effects beyond simple antibacterial action [18]. From a translational medicine perspective, this finding holds significant implications, as recurrent infections in elderly patients are often not solely maintained by bacterial presence but are closely associated with persistent inflammatory activation, compromised urinary epithelial barrier function, and altered local immune responses. Other frequently discussed mechanisms include inhibition of pathogen adhesion, reduction of oxidative stress, regulation of mucosal immunity, improvement of microcirculation, and restoration of gut or urinary tract microbiota. Although further research is required, these observations help explain why certain TCM interventions may alleviate symptoms and reduce recurrence rates despite exhibiting weaker direct bactericidal effects compared to standard antibiotics.

6 Existing Issues and Future Prospects

6.1 Advantages and Clinical Value of Traditional Chinese Medicine in Treating Recurrent Urinary Tract Infections in Elderly Patients

Traditional Chinese Medicine (TCM) holds at least four key advantages in managing recurrent urinary tract infections (UTIs) in elderly patients. Firstly, it provides a long-term management framework during both acute exacerbations and remission periods. Secondly, it enables personalized treatment based on individual constitution, symptoms, and syndrome patterns. Thirdly, it offers diverse intervention approaches including herbal decoctions, Chinese patent medicines, acupuncture, moxibustion, fumigation and washing therapy, as well as community-based integrated care. Fourthly, it is particularly suitable for elderly patients whose primary concerns extend beyond infection itself, encompassing symptoms such as fatigue, nocturia, chills, poor appetite, sleep disturbances, and fear of recurrent episodes —conditions that cannot be adequately addressed by antibiotics alone. In essence, the clinical value of TCM lies not only in anti-infective support but also in holistic regulation and recurrence prevention.

For elderly patients, this multidimensional value holds significant clinical implications. Many seniors discontinue medication due to gastrointestinal discomfort, dizziness, constipation, bitter taste of medications, or concerns about long-term antibiotic toxicity. Others fall into a cycle of recurrent symptoms, frequent medical visits, and escalating anxiety, which further impacts sleep quality and autonomic nervous system sensitivity. Therefore, a treatment approach that addresses both localized urinary symptoms and systemic functional decline—despite potentially limited measurable microbiological benefits—may enhance medication adherence and patient satisfaction. This likely explains why integrated traditional Chinese and Western medicine remains highly appealing in outpatient and community healthcare practices.

6.2 Limitations of Existing Evidence

Although current findings demonstrate certain promise, the overall evidence base remains relatively limited. Many studies are single-center observational studies with small sample sizes, short follow-up durations, and insufficient blinding or allocation concealment. While some dissertations and empirical summaries provide rich clinical details, their external generalizability is limited. Additionally, diagnostic criteria vary across institutions, and outcome measures lack consistency—including symptom scores, urinalysis results, urine culture conversion rates, recurrence rates, inflammatory markers, and quality of life. This heterogeneity hinders direct comparisons between studies and impedes the development of universally accepted treatment pathways. Another issue is that most available evidence primarily comes from elderly women, while data on elderly men, catheter-related recurrences, recurrent upper urinary tract infections, and populations with multiple geriatric comorbidities remain scarce.

6.3 Future Research Directions

Future research should focus on at least five key directions. First, multicenter randomized controlled trials with methodological transparency and adequate follow-up periods are required to determine whether Traditional Chinese Medicine (TCM) can effectively reduce recurrence rates after initial disease control. Second, standardized syndrome differentiation systems for recurrent urinary tract infections in elderly patients should be further refined to enable cross-regional and inter-institutional evidence comparison. Third, priority should be given to clinically meaningful outcome indicators such as recurrence duration, antibiotic usage volume, frailty-related symptom burden, and health-related quality of life, rather than relying solely on short-term urine test improvements. Fourth, in-depth studies are needed to explore the relationship between TCM interventions and microbiological phenomena including biofilm behavior, antimicrobial resistance, and urinary tract microbiota. Fifth, mechanistic research should better correlate laboratory indicators with clinical syndromes, enabling translational studies to support personalized prescriptions rather than

remaining at the level of isolated experimental observations.

7 Conclusion

In summary, research on Traditional Chinese Medicine (TCM) for treating recurrent urinary tract infections (UTIs) in elderly patients has evolved from traditional empirical knowledge and syndrome differentiation theories into a comprehensive field encompassing academic dissertations, community intervention studies, integrated Chinese-Western clinical research, and preliminary mechanism exploration. Existing literature suggests that TCM, particularly when combined with conventional therapies, may help alleviate urinary system symptoms, improve constitution-related discomfort, reduce inflammatory burden, and prevent recurrence. However, this field remains constrained by significant methodological heterogeneity and insufficient high-quality evidence. To establish more definitive roles for TCM in long-term management of recurrent UTIs in elderly patients and gain broader recognition within international medical academia, further standardized clinical studies and translational research are essential.

References

[1] Miao Beiliang, Ma Wenxin, Li Jing, et al. Research progress on traditional Chinese medicine in the treatment of recurrent urinary tract infections [J]. Journal of Modern Integrated Traditional Chinese and Western Medicine, 2024,33(20):2891-2896.

[2] Yang Xiaoqin, Gao Zhan, Shao Kuiqing, et al. Progress in integrated traditional Chinese and Western medicine treatment for recurrent uncomplicated urinary tract infections in women [J]. China Medical Guide, 2021,18(25):47-50.

[3] Zhou Renjie, Wang Lifan. Research progress on traditional Chinese medicine prevention and treatment of recurrent episodes of urinary tract infection [J]. Heilongjiang Journal of Traditional Chinese Medicine, 2023,52(6):84-87.

[4] Expert Consensus Writing Group on Diagnosis and Treatment of Urinary Tract Infections. Expert Consensus on Diagnosis and Treatment of Urinary Tract Infections (2015 Edition): Strategies for Antibiotic Selection and Treatment Recommendations for Special Types of Urinary Tract Infections [J]. Chinese Journal of Urology, 2015,36(4):245-248.

[5] Wei Hongsong, Wang Yongning, Chen Manping. Research progress on pathogenic factors of urinary tract infections [J]. Chinese Journal of Microbiology and Immunology, 2021,41(4):322-326.

[6] Duan Xingwang. Clinical observation of Zhu Ling decoction combined with antibiotics in the treatment of recurrent lower urinary tract infections in elderly women [J]. China Folk Therapy, 2021,29(14):88-89,95.

[7] Gu Jun, Wang Ting, He Liqun. Effect of Lei Huo Moxibustion combined with Yishen Tonglin Formula on recurrent urinary tract infections in elderly women in community settings [J]. Shanghai Medicine, 2024,45(10):35-38.

[8] Zheng Chao. Clinical study on Yiqi Zishen Tonglin method for treating recurrent urinary tract infections in elderly women with kidney deficiency and damp-heat syndrome due to damp-heat [D]. Changchun: Changchun University of Chinese Medicine, 2018.

[9] Xia Xiaolei. Clinical study on Qinglin Decoction fumigation and washing therapy for recurrent urinary tract infections in women [D]. Jinan: Shandong University of Traditional Chinese Medicine, 2020.

[10] Zhang Fujie. Clinical study on Tonglin Huayu Formula for treating recurrent lower urinary tract infection with heat-stasis syndrome [D]. Taiyuan: Shanxi University of Traditional Chinese Medicine, 2020.

[11] Chen Haote, Cai Chongyang, Huang Yasheng, et al. Treatment of recurrent urinary tract infections in elderly women from the perspective of spleen-kidney theory [J]. Zhejiang Journal of Traditional Chinese Medicine, 2023,58(5):345-347.

[12] Liang Dong, Yang Hongtao, Huang Wenzheng. Experience of Huang Wenzheng in treating recurrent urinary tract infections [J]. China Journal of Basic Medical Sciences of Traditional Chinese Medicine, 2020,26(10):1557-1558,1563.

[13] Shi Qing, Sun Luying, Zhang Jinhui, et al. Experience of Sun Luying in treating recurrent urinary tract infections [J]. Chinese Journal of Traditional Chinese Medicine, 2022,37(8):1655-1659.

[14] Liu Xingguo, Nie Cong, Fu Mingjie, et al. Clinical study on Fuzheng Tonglin Powder in the treatment of recurrent urinary tract infections with spleen-kidney deficiency and internal damp-heat accumulation [J]. Hebei Journal of Traditional Chinese Medicine, 2024,46(1):51-55.

[15] Kong Lin, Yang Yuchen, Chen Xiaozhong, et al. Observation on the efficacy of Huanglian Jiedu Decoction combined with Bazheng Powder in the treatment of urinary tract infection [J]. China Hospital Medication Evaluation and Analysis, 2019,19(9):1112-1113,1117.

[16] Gao Zhicai, Du Aimin. Acupuncture treatment for 58 cases of urinary tract infection [J]. Journal of Acupuncture and Moxibustion Clinical Practice, 2004,20(1):14.

[17] Miao B. Clinical observation of acupuncture combined with self-prepared Tonglin Decoction in the treatment of chronic urinary tract infection [J]. Heilongjiang Medical Journal, 2016,40(10):927.

[18] Zhong Yuwen, Su Hongwei, Luo Xiaoquan, et al. Study on the effect of Fuzheng Qingre Tonglin Formula on complicated urinary tract infection rats through regulation of the NLRP3 inflammatory small body pathway [J]. Journal of Hainan Medical University, 2023, 29(6): 415-421.