# The effect of silodosin versus darifenacin versus a combination of both drugs on ureteric stent-related symptoms

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**Received:** 26 May 2022
**Accepted:** 12 June 2022
**Published:** 05 April 2023

**The Egyptian Journal of Surgery** 2023, 41:899–906

**Background**
Ureteral stents represent a simple and effective method for renal and ureteric drainage and preservation of renal function owing to ureteric obstruction without external or visible devices.
**Objectives**
To evaluate the safety and efficacy of silodosin versus darifenacin and their combinations in reducing ureteral stent-related symptoms (SRS).
**Patients and methods**
A total of 178 patients who underwent ureteral stent stenting and developed SRS at first week were randomized into four groups (groups A–D) and assessed using a ureteral stent symptom questionnaire (USSQ) in each group. Group A used silodosin 8 mg, group B used darifenacin 7.5 mg, group C used both medications, and group D was the control group. All groups received the drugs for 14 days and then USSQ assessed in each group.
**Results**
USSQ score showed no statistically significant difference among the four groups after 1 week of ureteral stent application. At the end of the third week there was a significant decrease in USSQ score compared with group D. Comparing groups with each other showed that group C had the least USSQ score, indicating the best response.
**Conclusion**
The study showed significant improvement of ureteric SRSs in favor of combination of silodosin and darifenacin when compared with use only one of them. Both medications demonstrated a good safety and tolerability profile for medical improvement therapy in patients with ureteric stents.

**Keywords:**
darifenacin, silodosin, ureteral stent

Egyptian J Surgery 2023, 41:899–906

1110-1121

## Introduction

Ureteral stents are widely used during various urologic procedures to resolve obstruction caused by various reasons. They have been used for four decades [1]. However, ureteric stents are associated with various adverse effects. Patients experience lower urinary tract symptoms, including incomplete emptying (76%), frequency (60%), urgency (60%), dysuria (40%), pain (80%), and hematuria (54%) [2].

Various trials have been performed to relieve these symptoms, including different materials and designs of the ureteral stents to improve patients' quality of life (QoL) in association with the use of appropriate stent length and proper positioning of the proximal and distal ends [3]. Moreover, different types of medication were used to reduce these symptoms, including analgesics, alpha-adrenoreceptor blockers, and anticholinergic drugs. Many types of alpha-adrenoreceptor blockers such as alfuzosin, terazosin, and tamsulosin proved to be effective in the alleviation of ureteral stent-related symptoms (SRS) [4–6]. Silodosin is highly selective for the alpha (1 A) receptors located in the prostate, urethra, and bladder trigone in the lower urinary tract. The most common adverse reactions to silodosin are retrograde ejaculation, dizziness, diarrhea, orthostatic hypotension, and headache [7].

On the contrary, several studies reported beneficial effects of various anticholinergic medications in relieving ureteral SRSs [8,9] Darifenacin selectively blocks the muscarinic M3 receptor. M3 receptors are involved in the contraction of the urinary bladder. It is a well-established drug for the treatment of overactive bladder and urgency urinary incontinence [10]. Common unwanted anticholinergic effects of darifenacin include dry mouth, constipation, nausea,

stomach pain, blurred vision, dry eyes, dizziness, and weakness [11].

The aim of the study was to analyze and compare the safety and efficacy of silodosin versus darifenacin versus a combination of both drugs in the relief of ureteric SRS using a validated Arabic version of the ureteral stent symptom questionnaire (USSQ) [12].

## Patients and methods

A randomized controlled trial was conducted between September 2019 and August 2021 in Ain Shams University Hospitals after approval by the local ethical committee. All patients undergoing routine unilateral ureteric stent fixation after ureteroscopy for stone treatment were enrolled in the study for evaluation.

Informed written consent was taken from all the study participants. History and physical examinations were done in all the patients. A semi-rigid ureteroscope was used for treating ureteric calculi. After endoscopic stone lithotripsy and extraction, a 6-French (F) polyurethane ureteric double J (DJ) of appropriate length according to patient's height was placed. Inclusion criteria were patients of either sex within the ages of 18–45 years.

Exclusion criteria included patients having lower urinary tract symptoms owing to benign prostatic hyperplasia [International Prostate Symptom Score (IPSS=7)], overactive bladder, interstitial cystitis or chronic cystitis, a history of chronic prostatitis or chronic pelvic pain, chronic treatment with alpha-blockers, anticholinergic agents and analgesics, and ureteral stricture or obstruction caused by malignancy. Moreover, pregnant patients, patients with a history of postural hypotension or syncope, patients with severe or unstable heart failure, patients with severe renal failure, patients with severe liver failure, patients with a history of urinary retention, patients with severe constipation, or patients with uncontrolled wide-angle glaucoma were ruled out.

Postoperative radiograph KUB and urinary ultrasonography were done in all patients to identify residual stone fragment(s). Foley's catheter was removed on the first postoperative day, and patients were discharged with a 7-day course of oral antibiotics and on-demand analgesics according to pain sensation.

Patients were seen in outpatient clinic after 1 week of stent placement and were asked to answer a validated Arabic version of USSQ [12]. Scoring at first week was carried out to see the severity of DJ SRSs. After applying inclusion and exclusion criteria, 211 patients out of 272 reported DJ-related symptoms in the 1st week and, and of these, 11 patients were not willing to participate in the study, so a total of 200 patients were equally randomized into four groups (A, B, C, and D).

The groups received oral doses of the drugs as follows: group A – silodosin 8 mg OD, group B – darifenacin 7.5 mg OD, group C – combined silodosin 8 mg and darifenacin 7.5 mg OD, and group D – did not receive either drug (control). Patients were advised to take analgesics (diclofenac sodium 50 mg) as per requirement. All patients were informed of the adverse effects of the drugs.

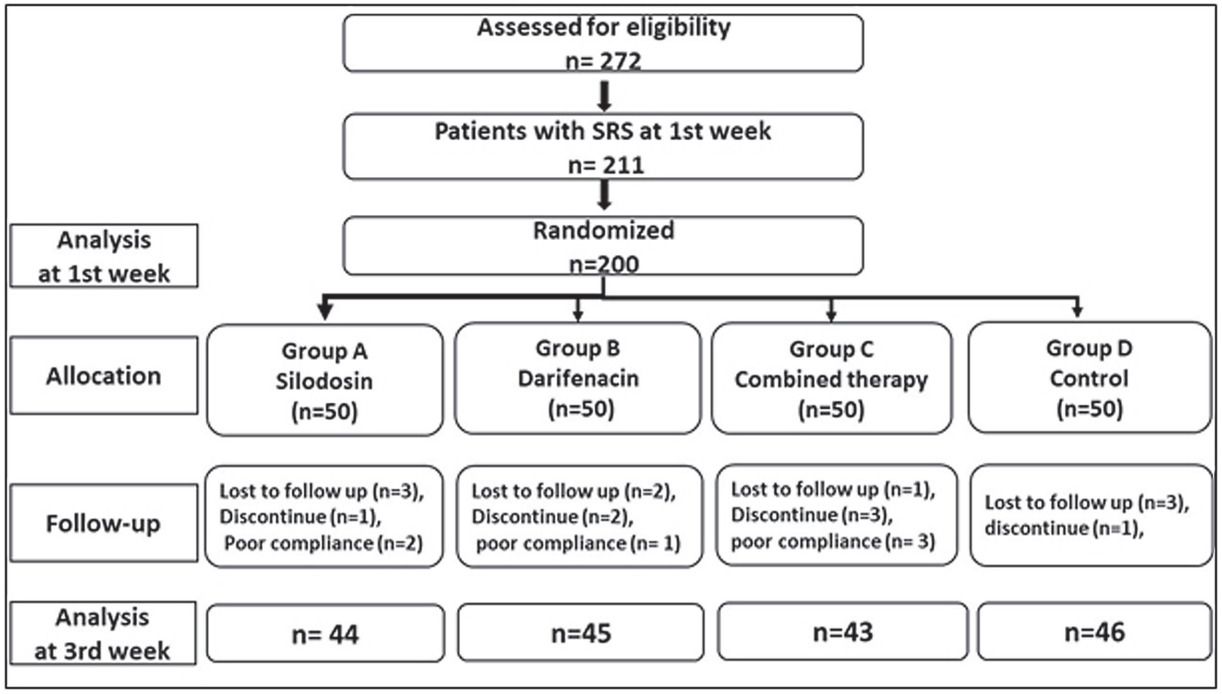
Patients were asked to come after 14 days of taking these drugs (at third week) with complete responses to USSQ items before the removal of DJ stents. A physician who was responsible for USSQ data collection was blind to patients' randomization. As for sample size and statistical analysis, the sample size was calculated using the G* Power program. A priori test with effect size of 0.25, an error protection of 0.05 at 80% study power was applied. A total of 94 patients formed the total sample size. The sample size was calculated using alpha power of 80%, a significance level of 0.05%, and *F* test with effect size of 0.25.

## Results

As indicated in Fig. 1, of 272 eligible patients, 211 (77.6%) complained of SRS in the first week. A total of 200 of these patients were included and randomly allocated to one of the four study groups. Owing to lack of follow-up, withdrawal of medication, or poor compliance, 22 patients were eliminated, leaving 178 patients for final analysis, who were distributed as follows: group A (silodosin), with 44 patients; group B (darifenacin), with 45 patients; group C (combined), with 43 patients, and group D (control), with 46 patients. During the study, no patient reported any drug-related adverse.

There was no statistically significant difference regarding demographic data as such patient age, sex, stone size, and ureteric level among the four study groups (Table 1). First-week analysis (baseline) of all USSQ parameters showed no statistically significant difference among the four groups (Table 2). However, the silodosin group showed the best mean among all other groups in the total score (mean=108), followed

**Figure 1**




Study design.

**Table 1 Demographic data among studied groups**

| Demographics | Group A silodosin (*N*=44) [*n* (%)] | Group B darifenacin (*N*=45) [*n* (%)] | Group C combined (*N*=43) [*n* (%)] | Group D control (*N*=46) [*n* (%)] | *F* | *P* value |
|---|---|---|---|---|---|---|
| Age (years) (mean±SD) | 36.7±6.6 | 34.9±6.3 | 36.6±5.6 | 35.3±6.8 | 0.44 | 0.7 |
| Sex | | | | | | |
| Male | 25 (57) | 26 (58) | 27 (63) | 25 (54) | 0.22 | 0.88 |
| Female | 19 (43) | 19 (42) | 16 (37) | 21 (46) | | |
| Stone size (mm) | | | | | 1.1 | 0.36 |
| Mean±SD | 11.4±3.3 | 13.2±3.8 | 13.3±4.3 | 12±4.4 | | |
| Stone level | | | | | | |
| Upper ureter | 14 (32) | 15 (33) | 14 (32.5) | 17 (37) | 0.13 | 0.94 |
| Middle ureter | 15 (34) | 14 (31) | 14 (32.5) | 15 (33) | | |
| Lower ureter | 15 (34) | 16 (36) | 15 (35) | 14 (30) | | |

Using one-way analysis of variance test.

by the control group, then the combined group, and finally, the darifenacin group.

During the third week analysis, a highly statistically significant difference ($P<0.01$) was evident in all USSQ parameters among the four study groups (Table 3). The largest difference among the four groups was in total scores followed by additional problems and urinary symptoms. The control group showed the worst mean among other groups regarding all USSQ parameters.

For urinary symptoms, pain, general health, work performance, and total scores, the combined group showed the best mean, followed by the darifenacin group, then the silodosin group and control group. For additional problems, both the combined and darifenacin groups showed similar means, followed by the silodosin group, and finally, the control group. For sexual issues, the darifenacin group showed the best mean followed by the combined group, the silodosin group, and the control group.

Post-hoc analysis at week 1 showed no statistically significant difference (Table 4). However, on week 3, a combined treatment had the best significant results among all USSQ parameters when compared individually with each other group. The darifenacin treatment showed the second-best result in urinary symptoms, sexual issues, and total scores, but the silodosin treatment was the second-best in pain and

**Table 2 Ureteral stent symptom questionnaire scores of all groups at first week**

| USSQ | Groups | Group A silodosin (*N*=44) | Group B darifenacin (*N*=45) | Group C combined (*N*=43) | Group D control (*N*=46) | *F* | *P* value |
|---|---|---|---|---|---|---|---|
| Urinary symptoms | Mean | 39 | 41 | 41 | 40 | | |
| | SD | 4 | 4 | 5 | 5 | 1.2 | 0.3 |
| | Minimum | 34 | 34 | 33 | 33 | | |
| | Maximum | 46 | 46 | 47 | 47 | | |
| Pain | Mean | 19 | 20 | 20 | 20 | 0.3 | 0.8 |
| | SD | 2 | 2 | 3 | 2 | | |
| | Minimum | 16 | 16 | 16 | 16 | | |
| | Maximum | 23 | 23 | 23 | 23 | | |
| Sexual issues | Mean | 7 | 8 | 7 | 7 | 2 | 0.11 |
| | SD | 1 | 1 | 1 | 1 | | |
| | Minimum | 5 | 6 | 6 | 5 | | |
| | Maximum | 9 | 9 | 9 | 8 | | |
| General health | Mean | 20 | 21 | 21 | 21 | 0.6 | 0.6 |
| | SD | 2 | 2 | 2 | 2 | | |
| | Minimum | 17 | 17 | 18 | 18 | | |
| | Maximum | 24 | 24 | 24 | 24 | | |
| Work performance | Mean | 9 | 9 | 9 | 9 | | |
| | SD | 3 | 2 | 2 | 2 | 0.11 | 0.96 |
| | Minimum | 6 | 5 | 6 | 6 | | |
| | Maximum | 14 | 13 | 15 | 13 | | |
| Additional problems | Mean | 14 | 14 | 13 | 13 | | |
| | SD | 1 | 1 | 2 | 2 | 2.01 | 0.12 |
| | Minimum | 12 | 12 | 10 | 10 | | |
| | Maximum | 15 | 15 | 15 | 15 | | |
| Total | Mean | 108 | 112 | 110 | 109 | | |
| | SD | 8 | 8 | 10 | 7 | 0.93 | 0.43 |
| | Minimum | 90 | 98 | 90 | 98 | | |
| | Maximum | 124 | 125 | 129 | 120 | | |

general health. Both silodosin and darifenacin showed the same effect on work performance when compared with any other group (Table 5).

Intragroup comparisons of USSQ parameters of each of the study groups were made at the third week, compared with the same respective groups at the first week (Table 6). The silodosin group showed a statistically significant improvement between week 1 and week 3 regarding urinary symptoms, sexual issues, general health, additional problems, and total score ($P$<0.01) and showed a statistically significant improvement regarding pain and work performance ($P$=0.02 and 0.03, respectively). The darifenacin group showed a highly statistically significant improvement between week 1 and week 3 regarding all USSD parameters except for work performance, where the improvement was significant ($P$=0.06). The combined group showed a highly statistically significant improvement regarding all USSD parameters. Finally, the control group showed the worst outcome. Regardless, there was no statistically significant difference regarding urinary symptoms and general health, with the rest of parameters showing statistically significant worsening in week 3 when compared with baseline (week 1).

## Discussion

Ureteral stents represent a simple and effective method of ureteral drainage to preserve renal function by management of ureteral obstruction for different causes and to avoid external devices [2]. However, symptoms associated with the use of these stents have a significant negative effect on patients' QoL. Staubli *et al.* [13] showed that up to 80% of patients reported a reduced QoL as a result of the symptoms arising from ureteral stents, and the procedure itself results in a considerable economic burden.

Although the exact pathophysiology of SR is not yet known, many theories explain these symptoms, as ureteric spasm or trigonal irritation caused by the distal end of the stent or the rise of intrarenal pressure due to urinary reflux during micturition [14].

Assessment of SRSs was done by many scoring systems like the IPSS, which was widely used, although it is nonspecific [15,16]. Later, Joshi and colleagues designed a USSQ that they validated for a better evaluation of SRSs and their effect on QoL. Their questionnaire consisted of 38 items split into six

**Table 3 Ureteral stent symptom questionnaire scores of all groups at third week**

| USSQ | Groups | Group A silodosin (*N*=44) | Group B darifenacin (*N*=45) | Group C combined (*N*=43) | Group D control (*N*=46) | *F* | *P* value |
|---|---|---|---|---|---|---|---|
| Urinary symptoms | Mean | 37 | 36 | 33 | 41 | | |
| | SD | 3 | 4 | 4 | 4 | | |
| | Minimum | 31 | 29 | 28 | 33 | 13.9 | <0.01** |
| | Maximum | 42 | 40 | 39 | 45 | | |
| Pain | Mean | 18 | 17 | 17 | 20 | | |
| | SD | 2 | 2 | 2 | 3 | | |
| | Minimum | 15 | 14 | 13 | 16 | | |
| | Maximum | 20 | 22 | 19 | 23 | 10.2 | <0.01** |
| Sexual issues | Mean | 6 | 6 | 6 | 8 | | |
| | SD | 1 | 1 | 1 | 1 | 11.03 | <0.01** |
| | Minimum | 4 | 4 | 4 | 5 | | |
| | Maximum | 8 | 7 | 8 | 10 | | |
| General health | Mean | 19 | 19 | 19 | 22 | | |
| | SD | 3 | 2 | 2 | 2 | 6.16 | <0.01** |
| | Minimum | 15 | 15 | 15 | 18 | | |
| | Maximum | 24 | 22 | 21 | 24 | | |
| Work performance | Mean | 8 | 8 | 7 | 10 | | |
| | SD | 2 | 2 | 2 | 3 | 6.12 | <0.01** |
| | Minimum | 5 | 5 | 5 | 6 | | |
| | Maximum | 12 | 12 | 11 | 15 | | |
| Additional problems | Mean | 11 | 11 | 10 | 14 | | |
| | SD | 1 | 1 | 1 | 2 | 22.8 | <0.01** |
| | Minimum | 10 | 9 | 9 | 11 | | |
| | Maximum | 14 | 13 | 13 | 16 | | |
| Total | Mean | 100 | 97 | 92 | 115 | | |
| | SD | 6 | 7 | 6 | 5 | 46.6 | <0.01** |
| | Minimum | 89 | 85 | 81 | 103 | | |
| | Maximum | 112 | 111 | 100 | 123 | | |

Using one-way analysis of variance test. USSQ, ureteral stent symptom questionnaire. ***P* value less than or equal to 0.01 is high significance.

**Table 4 Post-hoc analysis at week 1**

| Group 1 | Group 2 | Urinary symptoms | | Pain | | General health | | Work performance | | Sexual issues | | Additional problems | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MD | *P* value | MD | *P* value | MD | *P* value | MD | *P* value | MD | *P* value | MD | *P* value | MD | *P* value |
| Silodosin | Darifenacin | –2.15 | 0.66 | –0.6 | 1 | –0.80 | 1 | 0 | 1 | –0.35 | 1 | 0 | 1 | –3.9 | 0.84 |
| | Combined | –1.9 | 0.95 | –0.6 | 1 | –0.65 | 1 | –0.1 | 1 | –0.3 | 1 | 1 | 0.22 | –2.55 | 1 |
| | Control | –0.55 | 1 | –0.4 | 1 | –0.80 | 1 | 0.3 | 1 | 0.4 | 1 | 0.4 | 1 | –0.65 | 1 |
| Darifenacin | Combined | 0.25 | 1 | 0 | 1 | 0.15 | 1 | –0.1 | 1 | 0.05 | 1 | 1. | 0.22 | 1.35 | 1 |
| | Control | 1.6 | 1 | 0.2 | 1 | 0 | 1 | 0.3 | 1 | 0.75 | 0.18 | 0.4 | 1 | 3.25 | 1 |
| Combined | Control | 1.35 | 1 | 0.2 | 1 | –0.15 | 1 | 0.4 | 1 | 0.7 | 0.26 | –0.6 | 1 | 1.9 | 1 |

sections: pain, voiding symptoms, work performance, sexual matters, overall general health, and additional problems [17].

Till today, several trials done to reduce SRSs by trying different materials or length or positioning of the ureteral stents did not seem to affect these symptoms [18].

On the contrary, pharmacological therapy, including analgesics, anticholinergics, and a-blockers, was considered the most efficient method to relieve SRSs. The AUA/Society of Endourology Guidelines recommend using these medications to reduce stent discomfort as a moderate recommendation with level B evidence [19].

The mechanism of blocking alpha-receptors inhibits sympathetic stimulation and decreases the smooth muscle tone in the lower ureters leading to ureteral dilatation and reducing ureteral spasm, which relieves the related symptoms [20].

**Table 5 Post-hoc analysis at week 3**

| Group 1 | Group 2 | Urinary symptoms | | Pain | | General health | | Work performance | | Sexual issues | | Additional problem | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MD | *P* value | MD | *P* value | MD | *P* value | MD | *P* value | MD | *P* value | MD | *P* value | MD | *P* value |
| Silodosin | Darifenacin | 1.35 | 1 | 0.6 | 1.00 | 0.3 | 1 | 0.05 | 1 | 0.15 | 1 | 0.4 | 1 | 2.85 | 0.93 |
| | Combined | 4.15 | <0.01** | 0.95 | 1.00 | 0.55 | 1 | 0.6 | 1 | 0.5 | 1 | 0.65 | 0.97 | 7.4 | <0.01** |
| | Control | –3.6 | 0.03* | –2.6 | <0.01** | –2.05 | 0.02* | –2.2 | 0.016* | –1.6 | <0.01** | –2.7 | <0.01** | –14.7 | <0.01** |
| Darifenacin | Combined | 2.8 | 0.15 | 0.35 | 1.00 | 0.25 | 1 | 0.55 | 1.00 | 0.35 | 1.00 | 0.25 | 1.00 | 4.55 | 0.147 |
| | Control | –4.95 | <0.01** | –3.2 | <0.01** | –2.35 | <0.01** | –2.25 | <0.013* | –1.75 | <0.01** | –3.1 | <0.01** | –17.6 | <0.01** |
| Combined | Control | –7.75 | <0.01** | –3.55 | <0.01** | –2.6 | <0.01** | –2.8 | <0.01** | –2.1 | <0.01** | –3.35 | <0.01** | –22.15 | <0.01** |

MD, Mean difference, using Bonferroni post-hoc analysis. **P* value less than or equal to 0.05 is significance. ***P* value less than or equal to 0.01 is high significance.

Anticholinergic drugs have been thought to reduce involuntary bladder contraction caused by trigone irritation by blocking muscarinic receptors in the detrusor muscles, thus alleviating stent-induced overactive bladder symptoms [10].

Several studies have shown that alpha-1A blocker (tamsulosin) or antimuscarinic (solifenacin) monotherapy effectively improves the DJ stent-related lower urinary tract symptoms and the QoL of patients with no advantage provided by either drug. On the contrary, a combination of both medications is significantly effective than drug monotherapy in improving DJ stent-related lower urinary tract symptom and the patients' QoL [21–24], whereas other studies reported that a combined therapy of solifenacin and tamsulosin found no benefit over monotherapy [25].

Regarding silodosin, several studies assessed its role in the management of SRSs either alone (which improved QoL and voiding part of IPS scoring questionnaire) [26,27] or in comparison to or in combination with anticholinergic medications [28].

There is only one study that compared silodosin to a combination of silodosin and the steroid deflazacort in the treatment of ureteral symptoms by assessing IPSS and VAS; the study showed that a combination is better than silodosin alone [29].

As for darifenacin, only one study compared darifenacin with silodosin versus a combination of both medications using IPSS and VAPS; the dose of silodosin used was 4 mg, and the study showed that the combination therapy reduced obstructive and irritative symptoms and improved QoL more than monotherapy [30].

To our knowledge, this study is the first to evaluate the clinical efficacy of a combination therapy of silodosin and darifenacin for relieving SRSs using a validated version of the USSQ.

Results of our study based on a validated USSQ showed that the combination of silodosin with darifenacin improved ureteral SRSs compared with either silodosin or darifenacin monotherapy, especially for urinary symptoms, pain, general health, work performance, and total scores.

However, there were limitations in our study that resulted from the fact that it is a single-center study, and although the sample size was adequately calculated, the number of patients in each group was small.

**Table 6 Paired comparison for each group individually at first and third week**

| USSQ | Groups | Group A silodosin (*N*=44) | Group B darifenacin (*N*=45) | Group C combined (*N*=43) | Group D control (*N*=46) |
|---|---|---|---|---|---|
| Urinary symptoms | Mean | 1.65 | 5.15 | 7.70 | −1.40 |
| | SD | 3.83 | 6.36 | 6.68 | 7.45 |
| | SEM | 0.86 | 1.42 | 1.49 | 1.67 |
| | Minimum | −0.14 | 2.17 | 4.57 | −4.89 |
| | Maximum | 3.44 | 8.13 | 10.83 | 2.09 |
| | *P* value | <0.01** | <0.01** | <0.01** | 0.41 |
| Pain | Mean | 1.30 | 2.50 | 2.85 | −0.90 |
| | SD | 2.27 | 2.65 | 3.36 | 1.80 |
| | SEM | 0.51 | 0.59 | 0.75 | 0.40 |
| | Minimum | 0.24 | 1.26 | 1.28 | −1.74 |
| | Maximum | 2.36 | 3.74 | 4.42 | −0.06 |
| | *P* value | 0.02* | <0.01** | <0.01** | 0.04* |
| General health | Mean | 0.65 | 1.75 | 1.85 | −0.60 |
| | SD | 0.81 | 1.45 | 2.46 | 1.70 |
| | SEM | 0.18 | 0.32 | 0.55 | 0.38 |
| | Minimum | 0.27 | 1.07 | 0.70 | −1.39 |
| | Maximum | 1.03 | 2.43 | 3.00 | 0.19 |
| | *P* value | <0.01** | <0.01** | <0.01** | 0.13 |
| Work performance | Mean | 1.10 | 1.15 | 1.80 | −1.40 |
| | SD | 2.13 | 2.58 | 2.91 | 1.76 |
| | SEM | 0.48 | 0.58 | 0.65 | 0.39 |
| | Minimum | 0.11 | −0.06 | 0.44 | −2.22 |
| | Maximum | 2.09 | 2.36 | 3.16 | −0.58 |
| | *P* value | 0.03* | 0.06* | 0.01* | <0.01** |
| Sexual issues | Mean | 1.05 | 1.55 | 1.85 | −0.95 |
| | SD | 1.32 | 1.50 | 1.46 | 1.43 |
| | SEM | 0.29 | 0.34 | 0.33 | 0.32 |
| | Minimum | 0.43 | 0.85 | 1.17 | −1.62 |
| | Maximum | 1.67 | 2.25 | 2.53 | −0.28 |
| | *P* value | <0.01** | <0.01** | <0.01** | <0.01** |
| Additional problems | Mean | 2.40 | 2.80 | 2.05 | −0.70 |
| | SD | 2.09 | 1.54 | 2.01 | 0.57 |
| | SEM | 0.47 | 0.34 | 0.45 | 0.13 |
| | Minimum | 1.42 | 2.08 | 1.11 | −0.97 |
| | Maximum | 3.38 | 3.52 | 2.99 | −0.43 |
| | *P* value | <0.01** | <0.01** | <0.01** | <0.01** |
| Total | Mean | 8.15 | 14.90 | 18.10 | −5.95 |
| | SD | 5.60 | 9.10 | 11.36 | 7.06 |
| | SEM | 1.25 | 2.03 | 2.54 | 1.58 |
| | Minimum | 5.53 | 10.64 | 12.78 | −9.25 |
| | Maximum | 10.77 | 19.16 | 23.42 | −2.65 |
| | *P* value | <0.01** | <0.01** | <0.01** | <0.01** |

Paired *t* test was used, using one-way analysis of variance test. Minimum=lower end of 95% confidence interval, maximum=upper end of 95% confidence interval. USSQ, ureteral stent symptom questionnaire. **P* value less than or equal to 0.05 is significance. ***P* value less than or equal to 0.01 is high significance.

## Conclusion

A combination of silodosin and darifenacin significantly improved ureteric-SRSs when compared with using either drug alone, especially for urinary symptoms, pain, general health, and work performance.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

All the authors declare no competing interests.

## References

1 Zimskind PD, Fetter TR, Wilkerson JL. Clinical use of long-term indwelling silicone rubber ureteral splints inserted cystoscopically. J Urol 1967; 97:840–844.

2 Betschart P, Zumstein V, Piller A, Schmid HP, Abt D. Prevention and treatment of symptoms associated with indwelling ureteral stents: a systematic review. Int J Urol 2017; 24:250–259.

**3** Dellis A, Joshi HB, Timoney AG, Keeley FX Jr. Relief of stent related symptoms: review of engineering and pharmacological solutions. J Urol 2010; 184:1267–1272.

**4** Nazim SM, Ather MH. Alpha-blockers impact stent-related symptoms: a randomized, double-blind, placebo-controlled trial. J Endourol 2012; 26:1237–1241.

**5** Tehranchi A, Rezaei Y, Khalkhali H, Rezaei M. Effects of terazosin and tolterodine on ureteral stent related symptoms: a double-blind placebo-controlled randomized clinical trial. Int Braz J Urol 2013; 39:832–840.

**6** Yavuz A, Kilinc MF, Aydin M, Ofluoglu Y, Bayar G. Does tamsulosin or mirabegron improve ureteral stent-related symptoms? A prospective placebo-controlled study. Lower Urinary Tract Symp 2021; 13:17–21.

**7** Zhou L, Cai X, Li H, Wang KJ. Effects of α-blockers, antimuscarinics, or combination therapy in relieving ureteral stent-related symptoms: a meta-analysis. J Endourol 2015; 29:650–656.

**8** Zhang YM, Chu P, Wang WJ. PRISMA-combined α-blockers and antimuscarinics for ureteral stent-related symptoms: a meta-analysis. Medicine 2017; 96; 7.

**9** Tae BS, Cho S, Jeon BJ, Choi H, Park JY, Cho SY, Bae JH. Does mirabegron relieve ureteric stent-related discomfort? A prospective, randomized, multicentre study. BJU Int 2018; 122:866–872.

**10** Yamada S, Ito Y, Nishijima S, Kadekawa K, Sugaya K. Basic and clinical aspects of antimuscarinic agents used to treat overactive bladder. Pharmacol Ther 2018; 189:130–148.

**11** Steers WD. Darifenacin: pharmacology and clinical usage. Urol Clin 2006; 3:475–482.

**12** El-Nahas AR, Elsaadany MM, Tharwat M, Mosbah A, Metwally AH, Hawary A, Sheir KZ. Validation of the Arabic linguistic version of the Ureteral Stent Symptoms Questionnaire. Arab J Urol 2014; 12:290–293.

**13** Staubli SE, Mordasini L, Engeler DS, Sauter R, Schmid HP, Abt D. Economic aspects of morbidity caused by ureteral stents. Urol Int 2016; 97:91–97.

**14** Oh JJ, Lee S, Cho SY, Lee SW, Cho MC, Na W, Jeong CW. Effects of naftopidil on double-J stent-related discomfort: a multicenter, randomized, double-blinded, placebo-controlled study. Sci Rep 2017; 7:1–8.

**15** Giannarini G, Keeley FX, Valent F, Milesi C, Mogorovich A, Manassero F, Selli C. The Italian linguistic validation of the ureteral stent symptoms questionnaire. J Urol 2008; 180:624–628.

**16** Lee SJ, Yoo C, Oh CY, Lee YS, Cho ST, Lee SH, Cho JS. Stent position is more important than α-blockers or anticholinergics for stent-related lower urinary tract symptoms after ureteroscopic ureterolithotomy: a prospective randomized study. Korean J Urol 2010; 51:636–641.

**17** Joshi HB, Newns N, Stainthorpe A, MacDonagh RP, Keeley FX, Timoney AG. Ureteral stent symptom questionnaire: development and validation of a multidimensional quality of life measure. J Urol 2003; 169:1060–1064.

**18** Fischer KM, Louie M, Mucksavage P. Ureteral stent discomfort and its management. Curr Urol Rep 2018; 19:1–7.

**19** Assimos D, Krambeck A, Miller NL, Monga M, Murad MH, Nelson CP, Matlaga BR. Surgical management of stones: American urological association/endourological society guideline, PART I. J Urol 2016; 196:1153–1160.

**20** Davenport K, Timoney AG, Keeley FX. A comparative in vitro study to determine the beneficial effect of calcium-channel and #2-1#adrenoceptor antagonism on human ureteric activity. BJU Int 2006; 98:651–655.

**21** Jian Z, Chen Y, Liu Q, Liao B, Yang T, Li H, Wang K. Combination of solifenacin and tamsulosin may provide additional beneficial effects for ureteral stent-related symptoms—outcomes from a network meta-analysis. World J Urol 2019; 37:289–297.

**22** Salih EM, Koritenah AK, Yehya M, Mourad MM. The efficacy of alpha-1A blocker (tamsulosin), antimuscarinic (solifenacin) and their combination in the management of double-J stent-related lower urinary tract symptoms: a randomized controlled study. Afr J Urol 2021; 27:1–6.

**23** Hasbi BE, Palinrungi MA, Kholis K, Bakri S, Syahrir S, Kasim F. The effectiveness between tamsulosin and solifenacin combined with tamsulosin on treatment of ureteral stent-related symptoms. Nusantara Med Sci J 2021; 6:1–17.

**24** Sajid MT, Rehman SU, Akmal M, Ahmad H, Mirza ZI, Mahmood A. Comparison of solifenacin versus com bination of solifenacin and tamsulosin in improving unilateral double-J stent related lower urinary tract symptoms-a prospective randomized control trial. PAFMJ 2021; 71:45–50.

**25** Park J, Yoo C, Han DH, Shin DW. A critical assessment of the effects of tamsulosin and solifenacin as monotherapies and as a combination therapy for the treatment of ureteral stent-related symptoms: a 2×2 factorial randomized trial. World J Urol 2015; 33:1833–1840.

**26** Kim HW, Lee JH, Shin DG, Lee JZ. The effects of silodosin in the treatment of ureteral stent related symptoms. J Inclusion Phenomena Macrocyclic Chem 2015; 82:259–263.

**27** Tsai P, Wang C, Chang C, Chen H, Hsu C. Effects of silodosin on lower urinary tract symptoms due to a double-J stent: a prospective randomized study. Int J Nephrol Kidney Fail 2015; 1:3.

**28** Bhattar R, Tomar V, Yadav SS, Dhakad DS. Comparison of safety and efficacy of silodosin, solifenacin, tadalafil and their combinations in the treatment of double-J stent-related lower urinary system symptoms: A prospective randomized trial. Turk J Urol 2018; 44:228.

**29** Sabat DK, Karan D. Effect of silodosin and deflazacort combination in reducing symptoms related to indwelling ureteric stent: a randomised, double-blind trial. J Clin Diagn Res 2020; 14:2.

**30** Benedict A, Rajenthiran V, Eswaramurthy A. Effects of silodosin, darifenacin, and combination therapy for the treatment of ureteral stent related discomforts. Int Surg J 2021; 8:3031–3035.