

A Review of Research on Acupuncture and Moxibustion Treatment for De Quervain's Stenosing Tenosynovitis

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[Abstract]

Objectives : This study was performed to review articles concerning acupuncture and moxibustion treatment for De Quervain's Stenosing Tenosynovitis.

Methods : On-line databases including Cochrane Library, Pubmed, CNKI, NDSL and OASIS were searched to identify articles concerning acupuncture and moxibustion treatment for De Quervain's Stenosing Tenosynovitis (DQST). Several duplicated articles and those not relevant to this topic were excluded, as were review articles and commentaries.

Results : Fifty-one studies were identified, which included 28 clinical case studies with 1,227 patients and 23 randomized controlled trials with 2,040 patients. In these studies, acupuncture, acupotomy, moxibustion, pharmacopuncture, and laser acupuncture were used as DQST interventions. Although DQST is a common disease seen in clinical practice, only four of the 51 studies we identified in our search were published in Korean academic journals, all of which used pharmacopuncture.

Conclusion : Although the results of the studies to date provide evidence that acupuncture and moxibustion are effective treatments for De Quervain's Stenosing Tenosynovitis, the absence of a standard, objective evaluation tool, and a lack of reporting on the negative side-effects associated with treatment remain important factors that should be addressed in future studies.

Key words :

De Quervain;
Stenosing Tenosynovitis;
Acupuncture;
Moxibustion

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I. Introduction

According to the Health Insurance Review and Assessment Service, the number of patients suffering from De Quervain's Stenosing Tenosynovitis (DQST) has gradually increased from 85,906 in 2010 to 115,259 in 2016¹⁾.

DQST is a common disease that causes localized wrist pain of non-articular origin, and is caused by inflammation of the tendon sheath that invades the Abductor Pollicis Longus (APL) or Extensor Pollicis Brevis (EPB). It usually occurs when the wrist is stressed from extensive usage, such as in a baby-holding posture, and is typically more in women (about 75% of the patients) than in men. It can also result from overuse of the wrist in hobbies or professional tasks²⁾. There is a tendency for the pain to increase when the thumb is moved and other symptoms include edema, pain of the radial styloid process, and weakened grip strength³⁾. This disease can be diagnosed by Finkelstein's test, in which the thumb is placed inside the four fingers and the wrist is flexed in the direction of the little finger. DQST is diagnosed if this procedure induces pain⁴⁾.

Cold or warm massage, fixation, local massage and analgesics can all be used as non-surgical treatments for DQST⁵⁾. Although there is a report that topical steroid injection can effectively relieve symptoms, this conclusion is based mainly on observational studies, and furthermore, adverse reactions have been reported with this treatment including local infection, temporary symptom relief after injection, atrophy of subcutaneous fat, and, in rare cases, tendon rupture. If the symptoms persist beyond 6 months after conservative treatment, the tendon sheath can be removed by surgery, but by nature, this is invasive and there is the risk of complications, such as tendon dislocation, or damage to the superficial branch of the radial nerve⁶⁾.

Meanwhile, acupuncture and moxibustion therapy are often performed for the treatment of various musculoskeletal pain diseases. These techniques are some of the most well-recognized com-

plementary and alternative medical treatments for the alleviation of pain. Although the classical explanation of acupuncture's mechanism of action has been that it induces a change in the Qi (氣), or energy flow of the body, many studies have proposed different mechanisms. Local effects of acupuncture include dilatation of the blood vessels, distortion of the connective tissue, and changes in regional autonomic activity⁵⁾.

These characteristics make it reasonable to hypothesize that acupuncture and moxibustion treatment can be effective, conservative therapies for DQST. However, as of 2017, only four clinical case studies have been published in Korean medical journals regarding the efficacy of pharmacopuncture, such as the use of Bee venom or Cervus Elaphus, for the treatment of DQST⁶⁻⁹⁾.

Therefore, we performed this review of domestic and foreign databases to investigate the performance of acupuncture and moxibustion for treatment of DQST from a global perspective.

II. Research Methods

1. Research subjects and Search methods

In order to review the literature related to this research topic, we searched electronic databases within and outside of Korea. Foreign databases that were used included PubMed, Cochrane Library, and the China National Knowledge Infrastructure (CNKI). Korean databases searched included the National Digital Science Library (NDSL) and the Oriental Medicine Advanced Searching Integrated System (OASIS).

"Our search included all literature indexed in the databases listed above that were published before June 10, 2017. MeSH (Medical Subject Heading) search terms that were used included "De Quervain stenosing tenosynovitis", "De Quervain disease",

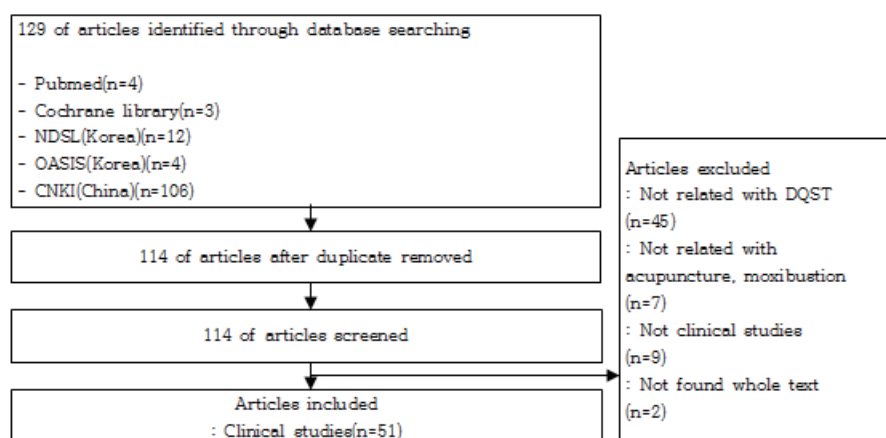


Fig. 1. Article selection flow chart

“Stenosing tenosynovitis”, “Acupuncture”, “Moxibustion”, and “Traditional Chinese medicine”. The following keywords were used for additional searches and were adjusted for each database: (“De Quervain stenosing tenosynovitis” OR “De Quervain disease” OR “Stenosing tenosynovitis”) AND (“Acupuncture” OR “Moxibustion” OR “Traditional Chinese medicine”). The details of the search strategies are presented in Appendix 1.

Clinical studies using acupuncture, acupotomy, or moxibustion as the primary interventional treatment were included in the study.

There was no restriction on the publication language or format (e.g., thesis or report) in the selection of papers. Literature research studies, studies that did not involve acupuncture treatment, or studies in which the primary interventional treatment was not acupuncture or moxibustion (such as fumigation, chuna, and patching therapy), were excluded (Fig. 1).

The first round of selection and the exclusion of duplicate studies was performed by a review of the titles and abstracts from the search results. For studies deemed to be relevant, we procured the original article and proceeded to the second round of selection/exclusion based on the aforementioned criteria. Based on this search strategy, a total of 51 studies, including 28 clinical case studies and 23 randomized controlled trials (RCTs), were selected and analyzed.

III. Results

1. Analysis of Study

1) Analysis of Research, Design, and Sample size

In 28 clinical case studies and 23 RCTs, 1,227 and 2,040 patients participated in these studies, respectively. Not including studies that failed to report gender, among the 3,138 total patients, 999 were men and 2,139 were women.

2) Treatment method

The main treatment methods in the included studies were acupuncture (31 studies), acupotomy (7 studies), pharmacopuncture, (5 studies), moxibustion (4 studies), and laser acupuncture (e.g. use of He-Ne lasers, super laser treatment, or TDP irradiation; 4 studies).

(1) Acupuncture

Fifteen clinical case studies and 16 RCTs were included for a total of 31 studies. Most of these studies used acupoints LI05, LI04, LI11, LI10, LU07, TE05, LI06, as well as Ashi points. In addition, one clinical case used Wuhu points 1 and 2 (五虎1,2穴) of Tung's acupoints and one RCT used wrist-ankle acupuncture (Tables 1 and 2).

Table 1. Summary of 15 Clinical Case Studies in which DQST Patients Were Treated with Acupuncture

Author (Year)	Sample size/sex	Main Treatment	Other treatment	Outcome Measures	Results
Jiang ¹¹⁾ (2014)	50/Male (n=18) Female (n=32)	Acupuncture (LI05, LI04, LI11, LI10, LU07, TE05)	None	3-level: Excellent, Good, Poor	100% Excellent (n=42) Good (n=8)
Jing ¹²⁾ (2005)	80/Male (n=38) Female (n=42)	Acupuncture (Ashi points)	None	3-level: Excellent, Good, Poor	100% Excellent (n=67) Good (n=13)
Sun ¹³⁾ (1996)	30/Male (n=8) Female (n=22)	Acupuncture (LI10, LI06, LU07, LI05, LI04, Ashi points)	None	3-level: Excellent, Good, Poor	100% Excellent (n=24) Good (n=5) Fair (n=1)
Xu ¹⁴⁾ (1960)	22/Male (n=11) Female (n=11)	Acupuncture (LU07, LI06, TE05, PC06, LI05, LI04, LI09, LI10, LI11, PC08, PC07, PC05, LU10)	None	4-level: Excellent, Good, Fair, Poor	77.3% Excellent (n=7) Good (n=9) Fair (n=4) Poor (n=1)
Zeng ¹⁵⁾ (1960)	17/Male (n=17)	Acupuncture (LI04, TE05, LI11, LI10, LU09, LU07, SI05, TE02, Ashi points)	None	3-level: Excellent, Good, Poor	100% Excellent(n=16) Good(n=1)
Gao ¹⁶⁾ (2011)	32/Male (n=12) Female (n=20)	Acupuncture (Wuhu1,2points(五虎1,2穴))	None	3-level: Excellent, Good, Poor	100% Excellent (n=22) Good (n=10)
Fu ¹⁷⁾ (2010)	76/Male (n=20) Female (n=56)	Acupuncture (Ashi points)	Moxibustion	3-level: Excellent, Good, Poor	97.4% Excellent (n=45) Good(n=29) Poor(n=2)
Li ¹⁸⁾ (1997)	38/Male (n=14) Female (n=24)	Warming Acupuncture (Ashi points)	None	3-level: Excellent, Good, Poor	95% Excellent (n=25) Good (n=11) Poor (n=2)
Sun ¹⁹⁾ (2003)	71/Male (n=35) Female (n=36)	Acupuncture (LI05, TE04, LI06, LI11, Ashi points)	Moxibustion		99% Improved
Xu ²⁰⁾ (1993)	105/Male (n=37) Female (n=68)	Acupuncture (LI05, LI06, LI11, Ashi points)	Moxibustion	3-level: Excellent, Good, Poor	95.24% Excellent (n=87) Good (n=18) Poor (n=5)
Li ²¹⁾ (1999)	40/Male (n=12) Female (n=28)	Acupuncture (Ashi points)	Moxibustion		91% Improved
Qu ²²⁾ (2015)	60/Male (n=34) Female (n=26)	Acupuncture (Ashi points, LU07)	Moxibustion	3-level: Excellent, Good, Poor	93.3% Excellent (n=45) Good (n=11) Poor (n=4)
Qian ²³⁾ (1998)	43/Male (n=12) Female (n=31)	Acupuncture (Ashi points)	Moxibustion	3-level: Excellent, Good, Poor	97.7% Excellent (n=40) Good (n=2) Poor (n=1)
Zhang ²⁴⁾ (2013)	72/Male (n=20) Female (n=52)	Silver Acupuncture (Ashi points)	Fumigation	3-level: Excellent, Good, Poor	93.1% Excellent (n=35) Good (n=31) Poor (n=6)
Zhao ²⁵⁾ (2013)	1/Female (n=1)	Acupuncture (Ashi points, LI05, LI11, LI04, LI10, LU07, SP06, BL23)	Fumigation		Improved

Table 2. Summary of 16 RCTs in which DGST Patients Were Treated with Acupuncture

Author (Year)	Group	Sample size/sex	Main Treatment	Main outcomes	p-value
Mohammadjavad ⁶ (2013)	Experimental Group	15/Male (n=2)	Acupuncture (Ashi points, LU05, LU07, LU09)	Q-DASH*: improved (baseline→2 wks→6 wks)	Q-DASH Baseline: p=0.185
		Female (n=13)		VAS: improved (baseline→2 wks→6 wks)	2 weeks: p=0.083 6 weeks: p=0.227
	Control Group	15/Male (n=4)	Injection Methylprednisolone acetate 1 mL & 2% lidocaine 1 mL, APL and EPB tendons sheath	Q-DASH*: improved (baseline→2 wks→6 wks)	VAS Baseline: p=0.071
		Female (n=11)		VAS: improved (baseline→2 wks→6 wks)	2 weeks: p=0.021 6 weeks: p=0.129
Zhang ²⁶ (2016)	Experimental Group	30/Male (n=7) Female (n=23)	Acupuncture (Muscle starting and ending points)	Total efficiency: 86.66% VAS: improved 8.47±1.252→3.13±2.36→3.33±2.339	Total efficiency: p<0.05 VAS: p<0.05
	Control Group	29/Male (n=6) Female (n=23)	Acupuncture (Ashi points)	Total efficiency: 73.33% VAS: improved 8.34±1.587→4.90±2.320→5.66±2.303	
Wu ²⁷ (2013)	Experimental Group	30/Male (n=11)	Warm acupuncture with moxibustion (Proximal points)	1) Total efficiency: 100%	1) p<0.05
		Female (n=19)		2) VAS: improved: 7.31±0.68→1.51±1.02	2) p<0.01
	Control Group	30/Male (n=10)	Warm acupuncture with moxibustion (Ashi points)	3) Clinical pain: improved: 4.68±0.75→0.59±1.01	3) p<0.01
		Female (n=20)		4) Pressure pain: improved: 4.08±1.36→0.49±0.76	4) p<0.01
Han ²⁸ (2016)	Experimental Group	30/ Not Reported	Surgical treatment	5) Function of wrist joint: improved: 4.03±1.32→0.59±0.94	5) p<0.01
				Clinical symptoms: improved: 14.27±1.54→3.18±1.05	5) p<0.01
	Control Group	30/ Not Reported	Injection Triamcinolone acetonide 40 mg, 2% lidocaine 5 mL (Ashi points)	1) Total efficiency: 90%	
				2) VAS: improved: 7.28±0.59→3.42±1.47	
				Total efficiency: 100%	Total Efficiency: p<0.05
				Subjective pain: improved (baseline→post-treatment→1 year)	Subjective pain
				13.5±1.1→5.6±1.5→2.0±0.8	Before & after treatment: p>0.05 A year after treatment: p<0.05
				Total efficiency: 70%	
				Subjective pain: improved (baseline→post-treatment→1 year)	
				12.8±0.5→5.0±0.8→10.2±1.0	

Control Group	30/ Not Reported	Acupuncture (Ashi points, LI11, LI04)	Total efficiency: 63% Subjective pain: improved (baseline→post-treatment→1 year) 13.0±0.8→6.0±1.1→12.2±0.5	Total Efficiency: $p < 0.05$ VAS
Control Group	30/ Not Reported	Acupotomy (Ashi points)	Total efficiency: 60% Subjective pain: improved (baseline→post-treatment→1 year) 12.5±0.4→6.0±0.7→8.1±0.6	Before & After treatment: $p > 0.05$ A year after treatment: $p < 0.05$
Experimental Group	30/ Not Reported	Surgical treatment	Total efficiency: 100% VAS: improved (baseline→post-treatment→1 year) 13.5±1.2→5.61±1.6→2.1±0.9	Total Efficiency: $p < 0.05$ VAS
Control Group	30/ Not Reported	Acupuncture (Ashi points, LI04, LI11)	Total efficiency: 63% VAS: improved (baseline→post-treatment→1 year) 13.1±0.9→6.1±1.2→12.1±0.6	
Control Group	30/ Not Reported	Injection Triamcinolone acetonide, 40 mg; 2% lidocaine 5 mL	Total efficiency: 70% VAS: improved (baseline→post-treatment→1 year) 12.9±0.6→5.1±0.9→10.3±1.1	
Control Group	30/ Not Reported	Acupotomy	Total efficiency: 60% VAS: improved (baseline→post-treatment→1 year) 12.6±0.3→6.2±0.8→8.0±0.7	
Experimental Group	47/ Not Reported	Acupuncture (Ashi points)	Total efficiency: 90% Quinnel score: improved: 2.77±1.22→0.34±0.87 VAS: improved: 3.66±1.55→0.72±1.44	Total Efficiency: $p > 0.05$ Quinnel score: $p < 0.05$
Control Group	46/ Not Reported	Injection 2% lidocaine hydrochloride 0.5 mL to 2 mL	Total efficiency: 88% Quinnel score: improved: 2.82±1.23→0.40±0.91 VAS: improved: 3.76±1.54→0.83±1.42	VAS: $p > 0.05$
Experimental Group	12/Male (n=7) Female (n=5)	ESWT † with Electro-acupuncture	Total efficiency: 100% VAS: improved (baseline→1→2→4→8 weeks) 8.28±0.82→3.32±0.77→3.05±0.81→2.48±0.52→1.92±0.81	Total efficiency: $p < 0.05$ VAS 1 week: $p < 0.05$ 2 weeks: $p < 0.01$
Control Group	12/Male (n=6) Female (n=6)	ESWT †	Total efficiency: 91.67% VAS: improved (baseline→1→2→4→8 weeks) 8.19±0.90→4.42±0.91→3.83±1.09→3.12±0.71→2.41±0.68	4 weeks: $p < 0.01$ 8 weeks: $p < 0.01$
Control Group	12/Male (n=5) Female (n=7)	Electro-acupuncture (Ashi points)	Total efficiency: 83.33% VAS: improved (baseline→1→2→4→8 weeks) 8.21±0.87→4.59±0.88→4.08±0.89→2.92±0.68→3.79±0.58	

Sun²⁸⁾
(2014)

Hu³⁰⁾
(2017)

Chang³¹⁾
(2016)

Lai ³² (1990)	Experimental Group	102/Male (n=78) Female (n=24)	Acupoint injection Prednisolone 2 mg, 1% procaine, mixed in 2 mL (LI05, TE04)	Total efficiency: 97.1% Excellent (n=87), Good, (n=12) Poor(n=3)	Total efficiency: p<0.01
	Control Group	102/Male (n=82) Female (n=20)	Acupuncture (LI05, TE04, LI11, GB34)	Total efficiency: 85.3% Excellent (n=68), Good (n=19), Poor(n=15)	
	Experimental Group	30/Male (n=3) Female (n=27)	Dong-Qi (動氣) acupuncture (GB34) After acupuncture, flex and extension of the shoulder, elbow, wrist joints	Total Efficiency: 100% VAS: improved: 6.82±1.39→1.85±1.53 1) At rest pain: improved: 3.13±1.63→0.93±1.01 2) Pressure pain: improved: 4.13±1.38→0.86±1.38 3) Swelling: improved: 1.53±1.35→0.53±1.16 4) Function of wrist joint: improved: 4.73±1.11→1.26±1.43 5) Clinical symptoms: improved: 13.53±5.03→3.61±3.90	VAS: p<0.01 1) p<0.05 2) p<0.05 3) p>0.05 4) p<0.05 5) p<0.05
Yu ³³ (2016)	Control Group	30/Male (n=4) Female (n=26)	Acupuncture (GB34, Ashi points)	Total Efficiency: 90% VAS: improved: 6.97±1.22→3.66±1.55 1) At rest pain: improved: 3.26±1.52→1.66±1.39 2) Pressure pain: improved: 4.26±1.14→1.93±1.43 3) Swelling: improved: 1.60±1.22→0.86±1.25 4) Function of wrist joint: improved: 4.80±0.99→2.46±1.25 5) Clinical symptom: improved: 13.80±4.46→6.93±4.83	
Shi ³⁴ (2013)	Experimental Group	34/Male (n=7) Female (n=27)	Selection of points with meridian syndrome differentiation (LU11, LI01, LU09, LI06)	Total efficiency: 100% Excellent (n=18), Good (n=16), Poor (n=0)	p<0.05
	Control Group	33/Male (n=6) Female (n=27)	Selection of points near radial styloid tenosynovitis (LI5, LI04, LI11, LI10)	Total efficiency: 81.82% Excellent (n=3), Good (n=24), Poor (n=6)	
Shi ³⁵ (2013)	Experimental Group	35/Male (n=8) Female (n=27)	Selection of points with meridian syndrome differentiation and acupuncture points with meridians of the same name. (LU11, LI01, LU09, LI06, SP03, ST40)	Total efficiency: 100% Excellent (n=26), Good (n=9), Poor (n=0)	p<0.05
	Control Group	69/Male (n=7) Female (n=27)	Select of points with meridian syndrome differentiation (LU11, LI01, LU09, LI06)	Total efficiency: 100% Excellent (n=18), Good(n=16), Poor(n=0)	
Zhang ³⁶ (2017)	Experimental Group	31/Male (n=9) Female (n=22)	Acupuncture (Wrist ankle 4 compartment, Ashi points, LI05, LI04)	Total efficiency: 96.8% VAS: improved: 7.58±1.23→1.74±1.61	p<0.05

Control Group	31/Male (n=10) Female (n=21)	Acupuncture (Ashi points, LU07, LI05, LI04)	Total efficiency: 90.3% VAS: improved: 7.42±1.09→3.23_2.43	1) <i>p</i> <0.05 VAS: <i>p</i> <0.01 2) <i>p</i> <0.05 3) <i>p</i> >0.05 4) <i>p</i> <0.05 5) <i>p</i> <0.05
Experimental Group	30/Male (n=12) Female (n=18)	Acupuncture (SP5) After acupuncture, flex and extension of the wrist joint	1) Total Efficiency: 100% 2) At rest pain: improved: 2.30±0.535→0.67±0.606 3) Swelling: improved: 2.33±0.547→1.23±0.504 4) Pressure pain: improved: 2.33±0.547→0.80±0.664 5) Grip pain: improved: 2.33±0.547→1.07±0.450	
Control Group	30/Male (n=14) Female (n=16)	Acupuncture (Ashi points)	1) Total Efficiency: 86.67% 2) At rest pain: improved: 2.20±0.484→1.03±0.556 3) Swelling: improved: 2.27±0.450→1.37±0.765 4) Pressure pain: improved: 2.20±0.484→1.07±0.521 5) Grip pain: improved: 2.27±0.450→1.30±0.651	
Experimental Group	30/Male (n=12) Female (n=18)	Acupuncture (LI05, LI10, LU07)	Total efficiency: 86.67% VAS: improved: 5.10±1.51→2.30±1.23 Guinell score: improved: 3.2±1.09→1.3±0.46 Mayo wrist score: improved: 62±7.72→75.6±12.91	<i>p</i> <0.05
Control Group	30/Male (n=14) Female (n=16)	Massage (LI05, LI10, LU07)	Total efficiency: 43.33% VAS: improved: 5.03±1.92→3.73±1.43 Guinell score: improved: 2.87±0.81→2.3±0.79 Mayo wrist score: improved: 64.8±9.51→68.6±8.89	
Experimental Group	48/Male (n=15) Female (n=33)	Joint massage (LI11, LI06, LI07, LI05, LU07, LI04, LU10)	Total efficiency: 95.83% Abduction: improved: 5.5±2.1→13.1±3.2 Adduction: improved: 11.1±6.8→27.4±4.2 Dorsiflexion: improved: 18.8±5.9→25.6±6.9 Plantarflexion: improved: 31.4±5.7→45.1±5.9	<i>p</i> <0.05
Control Group	44/Male (n=18) Female (n=26)	Acupuncture (LI11, LI06, LI07, LI05, LU07, LI04, LU10)	Total efficiency: 75% Abduction: improved: 3.6±2.6→10.9±2.1 Adduction: improved: 10.1±2.3→19.5±2.9 Dorsiflexion: improved: 14.7±4.5→19.7±4.3 Plantarflexion: improved: 27.1±5.2→30.9±3.7	
Experimental Group	25/ Not reported	Shock wave therapy combined with acupuncture (Ashi points, LI10)	Total efficiency: 96% VAS: improved VAS<3 (n=22), 3<VAS<6 (n=2), VAS≤6 (n=1)	<i>p</i> <0.05
Control Group	25/ Not reported	Shock wave only (Ashi points)	Total efficiency: 81.55% VAS: improved VAS<3 (n=15), 3<VAS<6 (n=5), VAS≤6 (n=5)	

Chen³⁷⁾
(2016)

Liao³⁸⁾
(2015)

Lu³⁹⁾
(2013)

Lin⁴⁰⁾
(2016)

* : Quick-Disabilities of the Arm, Shoulder, and Hand.
† : Extracorporeal Shock Wave Therapy.

(2) Acupotomy

The seven studies on acupotomy consisted of three clinical case studies and four RCTs. In all of

these studies, the acupotomy treatment was performed at Ashi points after lidocaine injection (Tables 3 and 4).

Table 3. Summary of 3 Clinical Case Studies in which DQST Patients Were Treated with Acupotomy

Author (Year)	Sample size/sex	Main Treatment	Other treatment	Outcome Measures	Results
Wang ⁴¹⁾ (2003)	62/Male (n=17) Female (n=45)	Acupotomy (Ashi points)	None	3-level: Excellent, Good, Poor	Total efficiency: 96.77% Excellent (n=56), Good (n=4), Poor(n=2)
He ⁴²⁾ (2007)	86/Male (n=24) Female (n=62)	Acupotomy (Ashi points)	Vitamin B12, 50 mg; Quenaoide, 20 mg; 2% Lidocaine 2 mL; mixed (5 mL total)	3-level: Excellent, Good, Poor	Total efficiency: 97.67% Excellent (n=76), Good (n=8), Poor (n=2)
Hu ⁴³⁾ (2014)	30/ Female (n=30)	Acupotomy (Ashi points)	None	3-level: Excellent, Good, Poor	Total efficiency: 90% Excellent (n=22), Good (n=5), Poor (n=3)

Table 4. Summary of 4 RCTs in which DQST Patients Were Treated with Acupotomy

Author (Year)	Group	Sample size/sex	Main Treatment	Main outcomes	p-value
Wang ⁴⁴⁾ (2015)	Experimental Group	75/Male (n=32) Female (n=43)	Acupotomy	Total efficiency: 100% Excellent (n=75)	<i>p</i> <0.05
	Control Group	75/Male (n=34) Female (n=41)	Injection (2% Lidocaine, 1 mL triamcinolone acetonide [10 mg], mixed)	Total efficiency: 88% Excellent (n=43), Good (n=23), Poor (n=9)	
Jiao ⁹⁾ (2014)	Experimental Group	107/Male (n=12) Female (n=95)	Acupotomy	Total efficiency: 95.33% VAS: improved: 7.2±1.4→1.7±0.9 Amount of Bleeding (mL): 6.2±1.5	<i>p</i> <0.05
	Control Group	103/Male (n=11) Female (n=92)	Surgery	Total efficiency: 81.55% VAS: improved: 7.5±1.6→2.9±1.1 Amount of Bleeding (mL): 25.8±2.2	
Sun ⁴⁵⁾ (2012)	Experimental Group	28/Male (n=9) Female (n=19)	Acupotomy with microwave (Ashi points)	Total efficiency: 92.86% Excellent, (n=18), Good (n=8), Poor (n=2)	<i>p</i> <0.05
	Control Group	28/Male (n=11) Female (n=17)	Acupuncture with TDP irradiation (Ashi points, LI06, LI04, LI05)	Total efficiency: 75% Excellent, (n=9), Good (n=12), Poor (n=7)	
Zhu ⁴⁶⁾ (2016)	Experimental Group	35/Male (n=5) Female (n=30)	Acupotomy (A1 Pulley)	VAS: 5.66±0.73→0.03±0.17→0.03±0.17 improved (baseline→post-treatment→4 months)	<i>p</i> <0.05
	Control Group	32/Male (n=7) Female (n=25)	Warm acupuncture with moxibustion	VAS: 5.94±0.67→4.28±1.33→4.25±1.27 improved (baseline→post-treatment→4 months)	

(3) Pharmacopuncture

The five studies on pharmacopuncture consisted of four clinical case studies and one RCT. The type of pharmacopuncture used was bee venom in three studies, Cervus Elaphus in one study, and Shenmai (參麥) injection in one study. Pharmacopuncture was performed mainly at Ashi points and LI05 (Tables 5 and 6).

(4) Moxibustion

All four studies on moxibustion were clinical case studies. Two of them performed ginger, smokeless moxibustion at Ashi points, and two of them performed a combination of Artemisia moxibustion and herbal patching therapy (Table 7).

Table 5. Summary of 4 Clinical Case Studies in which DQST Patients Were Treated with Pharmacopuncture

Author (Year)	Sample size/sex	Main Treatment	Other treatment	Outcome Measures	Results
Bak ⁶⁾ (2010)	3/ Female (n=3)	Sweet Bee Venom (Both LI05 points, 0.25 cc)	Acupuncture Moxibustion H-med, PTx	VNS (Resting pain, Pressure pain, and pain during breast-feeding, using Finkelstein's test) Baumgaertner's nine-point scale for Grip Power (Spherical/Pinch grip power)	improved
Kim ⁷⁾ (2005)	1/Male (n=1)	Bee Venom (Cyriax, 1st compartment) 0.005%, 0.01 cc → 0.005%, 0.1 cc → 0.01%, 0.1 cc → 0.02%, 0.1 cc → 0.04%, 0.1 cc (Every 2 days)	None	VAS, ROM (Adduction)	improved
Park ⁸⁾ (2004)	4/Male (n=1) Female (n=3)	Cervus Elaphus Herbal Acupuncture 0.8 – 1.0 cc	Not reported	VAS Baumgaertner's nine-point scale	improved
Song ⁹⁾ (2006)	1/ Female (n=1)	BV 8000:1 0.3 cc – 0.8 cc	None	VNRS	improved

Table 6. Summary of 1 RCT in which DQST Patients Were Treated with Pharmacopuncture

Author (Year)	Group	Sample size/sex	Main Treatment	Main outcomes	p-value
Xu ⁴⁷⁾ (2012)	Experimental Group	33/Male (n=14) Female (n=19)	Acupuncture with shenmai injection (Ashi points)	Total efficiency: 96.9% Excellent (n=25), Good(n=7), Poor(n=1) Total efficiency (after 3 months): 93.9% Excellent (n=23), Good (n=8), Poor(n=2)	p<0.05
	Control Group	32/Male (n=12) Female (n=20)	Acupuncture alone (Ashi points)	Total efficiency: 90.6% Excellent (n=23), Good (n=6), Poor(n=3) Total efficiency (after 3 months): 75% Excellent (n=19), Good (n=5), Poor (n=8)	
	Control Group	31/Male (n=12) Female (n=19)	Injection Triamcinolone acetone, 20 mg; 2% Lidocaine; mixed in 2 mL	Total efficiency: 87.1% Excellent (n=22), Good (n=5), Poor (n=4) Total efficiency (after 3 months): 74.2% Excellent (n=19), Good (n=4), Poor (n=8)	

Table 7. Summary of 4 Clinical Case Studies in which Patients Were Treated with Moxibustion

Author (Year)	Sample size/sex	Main Treatment	Other treatment	Outcome Measures	Results
Wang ⁴⁸⁾ (1996)	56/Male (n=21) Female (n=35)	Smokeless moxibustion	None	3-level: Excellent, Good, Poor	Total efficiency: 93% Excellent (n=35), Good (n=17), Poor (n=4)
Qin ⁴⁹⁾ (1992)	50/Male (n=3) Female (n=47)	Ginger moxibustion	None	3-level: Excellent, Good, Poor	Total efficiency: 100% Excellent (n=43), Good (n=7), Poor (n=0)
Gong ⁵⁰⁾ (2003)	62/Male (n=17) Female (n=45)	Moxibustion	Herbal Patching	3-level: Excellent, Good, Poor	Total efficiency: 98.4% Excellent (n=55), Good (n=6), Poor (n=1)
Cui ⁵¹⁾ (2002)	50/Male (n=12) Female (n=38)	Moxibustion	Herbal Patching	3-level: Excellent, Good, Poor	Total efficiency: 96% Excellent (n=38), Good (n=10), Poor (n=2)

(5) Laser acupuncture

The four studies that used laser acupuncture included two clinical case studies and two RCTs. Two

of these studies used a He-Ne laser, and 2 studies used TDP irradiation and super laser treatment together with acupuncture (Tables 8 and 9).

Table 8. Summary of 4 Clinical Cases Studies in which DQST Patients Were Treated with Laser Acupuncture

Author (Year)	Sample size/sex	Main Treatment	Other treatment	Outcome Measures	Results
Bu ⁵²⁾ (2004)	68/ Male (n=19) Female (n=49)	He-Ne Laser	Acupuncture (LU07, LI04, LI05, LU08, TE05, LI11, LI15, PC08, TE03)	3-level: Excellent, Good, Poor	Total efficiency: 79.4% Excellent (n=35), Good (n=19), Poor (n=14)
Wang ⁵³⁾ (1998)	17/ Female (n=17)	TDP	Acupuncture (LI04, LU07, LI05, LI11, LI07, TE04, LI10)	3-level: Excellent, Good, Poor	Total efficiency: 82.3% Excellent (n=14), Good (n=0), Poor (n=3)

Table 9. Summary of 2 RCTs in which DQST Patients Were Treated with Laser Acupuncture

Author (Year)	Group	Sample size/sex	Main Treatment	Main outcomes	p-value
Zhou ⁵⁴⁾ (2014)	Experimental Group	37/Not reported	Acupuncture with He-Ne laser (Ashi points)	Total efficiency: 100% Excellent (n=33), Good (n=4), Poor(n=0)	<i>p</i> <0.05
	Control Group	38/Not reported	TDP irradiation (Ashi points)	Total efficiency: 52.6% Excellent (n=4), Good (n=16), Poor (n=18)	
Yang ⁵⁵⁾ (2012)	Experimental Group	72/Female (n=72)	Acupuncture with super laser treatment	Total efficiency: 97.22% Excellent (n=64), Good (n=3), Fair (n=3), Poor (n=2), Reoccurrence (n=11)	<i>p</i> <0.05
	Control Group	72/Female (n=72)	Acupuncture (LI04, LI07, LI09)	Total efficiency: 91.67% Excellent (n=42), Good (n=14), Fair (n=10), Poor (n=6), Reoccurrence (n=23)	

3) Assessment tools

Scales for evaluating pain intensity, such as the Visual Analogue Scale (VAS) and the Visual Numeric Rating Scale (VNRS), were used in a total of 18 studies. The Mayo wrist score was used in one study and the Quinnee score was used in two studies. Only two studies evaluated the range of motion (ROM) of the wrist joint, and one of them used the Quick-Disabilities of the Arm, Shoulder, and Hand (Q-DASH) questionnaire. In two Korean studies, patient satisfaction before and after treatment was evaluated using Baumgaetner's nine-point scale. The most common assessment tool used among the studies, however, was a doctor's subjective assessment of the patient's pain, discomfort during walking, and degree of recovery after treatment. Among these studies, 31 used four-step classifications (e.g. excellent, good, fair, and poor), and 11 of the studies used three-step classifications (e.g. excellent, good and poor).

4) Reports on adverse reactions and side effects

Out of the 51 studies, only one study reported adverse events and side effects. In the study by Jiao and Wang¹⁰, the amount of bleeding during treatment was compared between the acupuncture treatment group and the surgical control group. They also compared nerve injuries, neuromuscular injuries, and adhesion recurrences after treatment. In the acupotomy treatment group (n=107), five patients showed nerve injuries, six showed neuromuscular injuries, and three had adherent recurrence; thus, 14 (13.08%) of the patients reported side effects. Of the 103 patients in the surgical control group, four had nerve injuries, five had neuromuscular injuries, and four had adhesion recurrence; thus, 13 (12.62%) of the patients reported side effects ($p < 0.05$).

2. Synthesis of research trends

As a result of summarizing the studies without

limiting the publication period or language, 51 studies were found to satisfy the inclusion criteria. Among the 51 studies, almost all of them (46) were performed in China and published in Chinese. One study was performed in Iran and published in English, and the remaining four studies were performed in South Korea and published in Korean. Despite the fact that it is a relatively common disease, there have been few studies on the application of acupuncture for treatment of DQST in South Korea and English-speaking countries.

Twenty-one of the studies were published before 2010 and 30 were published since then. When we looked at the treatment methods by year, among the 32 studies that used traditional acupuncture treatment, 11 (34.38%) were published before 2010 and 21 (65.63%) were published since then. Of the seven studies that used acupotomy treatment, two (28.57%) were published before 2010 and five (71.43%) since then. Of the five studies that used pharmacopuncture, three (60%) were published before 2010 and two (40%) since then. All four studies using moxibustion were conducted before 2010. Of the four studies that used laser treatment, two of them were published before 2010 and two were published since then. In summary, according to this data, the number of studies using acupuncture techniques for DQST treatment has been increasing steadily since 2010, and in particular, studies using acupotomy have seen the greatest increase.

Of the 51 total studies, nine of them did not state which acupoints were used for acupuncture and moxibustion. In the remaining 42 studies, the most frequently used acupoints were Ashi points, which were used in 29 studies. The next most commonly used acupoints were LI05, LI11, LI04, LI10, and LI06, as shown in Table 10.

Excluding Ashi points, acupoints in the large intestine meridian were most frequently selected. In particular, LI05 is often used for treatment of DQST because it is located near the anatomical snuffbox, which is formed by the APL and EPB.

Table 10. Acupoint Usage Among 42 Studies for the Treatment of DQST Patients

Number of Studies	Acupoints
29	Ashi points
15	LI05
13	LI11, LI04
9	LI10
8	LI06
3	TE05, TE04, LU09, LI07, LU07
2	PC08, LU10, LI09, LI01, GB34
1	ST40, SP06, SP03, PC07, PC06, PC05, BL23, LU08, TE03, Wuhu 1,2 (五虎1,2)

IV. Discussion

DQST is known to occur predominantly in people who perform repetitive motions, and is most frequently caused by the overuse of the wrists and thumbs in the last stage of pregnancy or during breast-feeding in women aged 30 – 50 years⁶. When DQST occurs, the most common symptom that is reported by patients is pain and tenderness on the radial styloid, which occasionally radiates toward the distal thumb or proximal lower forearm. Local edema often occurs at the distal radius and patients may complain that they are unable to use their hands properly due to discomfort².

In these cases, Western doctors generally use non-surgical treatments first, such as rest, cold packs, nonsteroidal anti-inflammatory drugs (NSAIDs), exercise therapy, and splints. Corticosteroid injection is usually only considered if the patient does not respond to the initial conservative treatment. In the past, corticosteroid injection was used as the initial treatment in severe cases of DQST; however, controversy arose regarding the efficacy of this treatment. Other conservative treatments such as acupuncture can be considered for early or mild cases with surgery reserved for cases that fail to resolve following corticosteroid injection⁵⁶.

In this study, a total of 51 DQST studies, made up of 28 clinical case studies and 23 RCTs, were obtained and analyzed by searching domestic and foreign databases. Eight RCTs compared a western-medicine treatment group with acupotomy, acupuncture, and pharmacopuncture treatment groups. One RCT compared a group treated with a combination of electro-acupuncture and extracorporeal shock wave therapy (ESWT) with each single treatment group³⁰. Two of the eight RCTs concluded that the acupotomy or acupuncture treatment was more effective than blocking therapy^{44,47}, and one concluded that the acupotomy treatment was more effective than surgical therapy¹⁰. On the other hand, two of the RCTs concluded that surgical methods were more effective than acupotomy and acupuncture treatments in terms of the recurrence rate at two different time-points (immediately and one year post-treatment)²⁸⁻²⁹. In the study by Hadianfard et al⁵, acupuncture was not significantly more effective than steroid injection ($p > 0.05$), but it was concluded that acupuncture can be considered an effective, well tolerated, and safe alternative option for the treatment of patients suffering from DQST. In two of the remaining three studies, the combination of shock wave therapy and acupuncture treatment was more effective than each of the treatments alone⁴⁰. In addition, in the study by Xu et al⁴⁷, it was concluded that blocking therapy with triamcinolone acetonide and lidocaine applied to acupoints was more effective than acupuncture therapy or blocking therapy alone.

Recent research has focused on the mechanisms behind the pain relief provided by acupuncture therapy⁵⁷. For example, the study by Maeda et al⁵⁸ produced useful data with the use of functional MRI, by observing changes in the brain structure during acupuncture treatment for carpal tunnel syndrome. Thus, the scientific explanation underlying acupuncture-mediated pain relief are beginning to be revealed, and acupuncture is being used more frequently for various pain disorders⁵⁷. Furthermore, a number of different variations of

acupuncture have been developed, such as pharmacopuncture, thread embedding acupuncture, acupotomy, and laser acupuncture. Thus many different therapeutic options can be explored in addition to traditional acupuncture.

In four of the studies in our analysis, distal acupoint selection treatment and Ashi point treatment of DQST were compared. In the study by Yu³³, the bending of the shoulder, elbow, and wrist joint after acupuncture at the unilateral GB34 with Ashi points compared with after acupuncture at the GB34. Chen³⁷'s study concluded that Dong-Qi (動氣) therapy, which is performed by bending and spreading the wrist joint after acupuncture at SP05 is more effective than acupuncture at Ashi points alone. The two studies by Shi^{34,35} compared treatment between acupuncture at Ashi points with treatment based on meridian syndrome differentiation. In the first study, acupuncture at LU09 and LI06 after bleeding to LU11 and LI01 was compared with Ashi points. The second study compared acupuncture at LU09 and LI06 with SP03 and ST40 with the selection of points by meridian syndrome differentiation and acupuncture points with meridians of the same name. These studies concluded that distal acupoint selection was used to improve the cure and recurrence rates. However, there is still confusion about which treatment is superior and more precisely designed RCTs will be needed to resolve this issue.

In the study by Chang³¹, the combination of ESWT and electro-acupuncture significantly increased the treatment rate and decreased the VAS compared to electro-acupuncture or ESWT alone ($p < 0.05$). Similarly, in the study by Lin et al⁴⁰, the combination of shock wave therapy and acupuncture significantly increased the treatment rate and decreased the VAS compared to shock wave therapy alone ($p < 0.01$). These studies indicate that cooperative treatment between Western and Korean medicine can provide a synergistic effect and a more effective treatment for patients.

The studies by Bak and Lee⁶, Hu et al⁴³, and Yang and Zeng⁵⁵ demonstrate the effective treat-

ment of DQST symptoms in women in the postpartum and lactation periods by using acupuncture in combination with bee venom, acupotomy, and laser acupuncture, respectively. These studies suggest that acupuncture treatment during the relatively more drug-sensitive lactation period may be an effective and desirable alternative to invasive surgery or medication.

Among the 51 studies in our analysis, 18 of them assessed outcomes using the VAS, one study used the Mayo Wrist Score, two studies used the Quinnee score, and two studies recorded outcomes based on wrist ROM. In addition, patient self-evaluation such as the Q-DASH questionnaire and Baumgaetner's nine-point scale were utilized in one and two studies, respectively. In 42 out of 46 (91.3%) Chinese studies, doctors used subjective scales to measure the pain and degree of discomfort during walking of each patient. The scales were divided into three or four levels, for example, excellent, good, fair, and poor. However, these scoring systems lack objectivity in evaluating the various treatments.

With regard to adverse reactions and side effects: Only one study compared nerve injuries, neuromuscular injuries, and adhesion recurrences after treatment in an acupuncture treatment group versus a surgical treatment group. Future studies should not overlook the side effects and adverse reactions associated with the treatments in order to establish high-quality support for acupuncture as a safe and effective treatment for DQST.

In comparison with Chinese research, where DQST treatment with various acupuncture methods (e.g. traditional, moxibustion, and pharmacopuncture) has been well studied, Korean researchers have carried out only four case studies using pharmacopuncture as a treatment for DQST, even though this disease is relatively common in Korea. In order to establish an objective evaluation of the efficacy of Korean acupuncture therapy for DQST treatment, further case-control studies or large-scale RCTs that employ various Korean medical practices are needed.

One limitation of this study is that it is a non-systematic literature review (as opposed to a systematic literature review) because it includes all domestic and foreign studies regarding the use of acupuncture and moxibustion for treatment of DQST regardless of their quality. Therefore, additional studies, including systematic literature review and meta-analyses, should be conducted to provide more rigorous support for the use of acupuncture for treatment of DQST.

V. Conclusion

A total of 51 studies, consisting of 28 case reports and 23 RCTs, were selected and analyzed according to the research methods defined in this paper. The results of the analysis are as follows.

1. The findings of this study support the preferential use of acupuncture, acupotomy, pharmacopuncture, moxibustion, and laser acupuncture as conservative therapies for the treatment of DQST.
2. The most common treatments used in the 51 studies were Acupuncture (60.78%) followed by Acupotomy (13.73%), Pharmacopuncture (9.8%), Moxibustion (7.84%) and Laser acupuncture (7.84%). The most commonly used acupoints for acupuncture treatment of DQST were Ashi points and acupoints, such as LI05, LI11, LI04, LI10 and LI06 in the Large Intestine Meridian.
3. In order to provide objective evidence for the efficacy of acupuncture and moxibustion for treatment of DQST, a wider range of studies and case reports with increased numbers of patients will be required. In addition, the use of objective and standard outcome scoring scales and the accurate reporting of side ef-

fects and adverse events should be included in future studies.

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Appendix 1. Search Formulas and Results for Each Database Search

<Results for Pubmed>

Search	Query	Items found
#1	Search "De Quervain stenosing tenosynovitis"[tw]	3
#2	Search "De Quervain disease"[mh]	179
#3	Search "De Quervain disease"[tw]	208
#4	Search "Stenosing tenosynovitis"[tw]	187
#5	Search "Acupuncture"[mh]	21185
#6	Search "Acupuncture"[tw]	23491
#7	Search "Moxibustion"[mh]	1511
#8	Search "Moxibustion"[tw]	2067
#9	Search "Traditional Chinese medicine"[tw]	13128
#10	Search (((("De Quervain stenosing tenosynovitis"[tw]) OR "De Quervain disease"[mh]) OR "De Quervain disease"[tw]) OR "Stenosing tenosynovitis"[tw])	375
#11	Search (((((Acupuncture[mh]) OR Acupuncture[tw]) OR Moxibustion[tw]) OR Moxibustion[mh]) OR Traditional Chinese medicine[tw])	37468
#12	Search ((((((De Quervain stenosing tenosynovitis[tw]) OR De Quervain disease[mh]) OR De Quervain disease[tw]) OR Stenosing tenosynovitis[tw])) AND (((((Acupuncture[mh]) OR Acupuncture[tw]) OR Moxibustion[tw]) OR Moxibustion[mh]) OR Traditional Chinese medicine[tw]))	4

<Results for Cochrane library>

Search	Query	Items found
#1	Search De Quervain stenosing tenosynovitis	5
#2	Search De Quervain disease	41
#3	Search Stenosing tenosynovitis	10
#4	#1 OR #2 OR #3	47
#5	Search Acupuncture	10895
#6	Search Moxibustion	3570
#7	Search Traditional Chinese medicine	13756
#8	#5 OR #6 OR #7	22900
#9	#4 AND #8	3

<Results for OASIS Database>

Search	Query	Items found
#1	Search De Quervain stenosing tenosynovitis	0
#2	Search De Quervain disease	5
#3	Search Stenosing tenosynovitis	0
#4	#1 OR #2 OR #3	5
#5	Search Acupuncture	3902
#6	Search Moxibustion	660
#7	Search Traditional Chinese medicine	152
#8	#5 OR #6 OR #7	4132
#9	#4 AND #8	4

<Results for NDSL Database>

Search	Query	Items found
#1	Search De Quervain stenosing tenosynovitis	49
#2	Search De Quervain disease	348
#3	Search Stenosing tenosynovitis	220
#4	#1 OR #2 OR #3	539
#5	Search Acupuncture	38617
#6	Search Moxibustion	10168
#7	Search Traditional Chinese medicine	49000
#8	#5 OR #6 OR #7	85612
#9	#4 AND #8	12

<Results for CNKI>

Search	Query	Items found
#1	SU=("De Quervain stenosing tenosynovitis"+"De Quervain disease"+"De Quervain"+"Stenosing tenosynovitis"+"桡骨茎突狭窄性腱鞘炎")	338
#2	SU=("Acupuncture"+"Moxibustion"+"Traditional Chinese medicine"+"针"+"灸")	388270
#3	#1 AND #2	106