



# Journal of Acupuncture Research

Journal homepage: <http://www.e-jar.org>

Review Article

## A Literature Review of Clinical Studies Using Sa-am Acupuncture



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### ABSTRACT

#### Article history:

Submitted: June 28, 2021

Revised: July 13, 2021

Accepted: July 16, 2021

#### Keywords:

Sa-am acupuncture, Korean medicine, review

Sa-am acupuncture originated in the Chosun Dynasty and is a distinct feature of Korean medicine. It has been used to treat various diseases and conditions in clinical practice however, there is insufficient scientific evidence to support the use of Sa-am acupuncture. We aimed to comprehensively review the clinical studies of Sa-am acupuncture retrieved from national and international databases (MEDLINE, EMBASE, the China National Knowledge Infrastructure, and 3 Korean databases). There were 52 articles reviewed including 29 case studies, 19 randomized controlled trials (RCTs), and 4 uncontrolled trials. Neurological disorders were the most frequently studied, and kidney tonification, and directional supplementation and draining were the most frequently used methods. Overall, the outcomes were generally positive however, there were many additional treatments together with Sa-am acupuncture reported in the case reports, and the quality of evidence was low in the RCTs. Future studies should report the detailed method of practicing Sa-am acupuncture treatment and focus on the specific effect of Sa-am acupuncture with rigorous design to scientifically support the clinical use of Sa-am acupuncture.

<https://doi.org/10.13045/jar.2021.00115>  
pISSN 2586-288X eISSN 2586-2898

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### Introduction

Sa-am acupuncture was invented by Sa-am in the Chosun Dynasty and is a method of acupuncture which originated in Korea [1]. It uses the characteristics of acupuncture points and meridians based on Huangdineijing, which is different from conventional acupuncture [2]. In a survey of clinical practice in Korea in 2005, Sa-am acupuncture was the 2<sup>nd</sup> most frequently used acupuncture method following conventional acupuncture, and 50.6% of Korean medicine doctors used Sa-am acupuncture [3].

Sa-am acupuncture uses the 5 Shu acupuncture points, and the main principles are “tonification-sedation between deficiency and excess” and “tonification-sedation between coldness and heat [4].” If a patient is diagnosed with lung deficiency, the lung-tonification method is used in Sa-am acupuncture by tonifying LU9, SP3, and sedating HT8 and LU10. The 4 acupuncture points are selected

based on the 5 Shu acupuncture points theory, and the practitioner can use a supplementation and draining method (SDM). However, there is no generally approved SDM. Consequently, this is an obstacle when using Sa-am acupuncture in clinical practice and describing the possible benefits of Sa-am acupuncture.

Clinical studies of Sa-am acupuncture are being conducted however, Sa-am acupuncture is usually assessed alongside conventional acupuncture, and has not been paid as much attention as conventional acupuncture. A comprehensive review of clinical studies (rather than classic text books) using Sa-am acupuncture, has not been conducted therefore, we aimed to comprehensively review clinical studies investigating Sa-am acupuncture, and suggest directions for future studies using Sa-am acupuncture.

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## Materials and Methods

### Data sources and search method

National and international online databases were searched (MEDLINE, EMBASE, the China National Knowledge Infrastructure for Chinese studies, the Research Information Sharing Service, the National Digital Science Library, and the Oriental Medicine Advanced Searching Integrated System) using the search term “Sa-am acupuncture” in each language. Articles published up to 31 March 2021 were included in the review.

### Inclusion criteria

Clinical research articles where Sa-am acupuncture was investigated were included and reviewed in this study. Any type of clinical study, such as randomized controlled trials (RCTs), uncontrolled clinical trials (UCTs), observational studies, and case studies was included in this review.

### Exclusion criteria

Animal studies, literature reviews and clinical studies that did not investigate Sa-am acupuncture were excluded from this review.

### Data collection

Two researchers selected articles based on the inclusion and exclusion criteria. Two researchers independently extracted data. Data on the 1<sup>st</sup> author, country, publication year, study type, disease or health condition of patients, number of patients, Sa-am acupuncture method including a SDM, additional treatments, control group intervention (if available), outcome measurements, and overall results were extracted for review. Additionally, for RCTs, the risk of bias was assessed using the Cochrane risk of bias tool.

## Results

A total of 105 articles were retrieved after excluding duplications. There were 54 articles selected after reviewing the titles and abstracts. After reviewing the full manuscript, 52 articles were included in the literature review. A flowchart of this study using Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 is shown in Fig. 1 [5].

There were 29 articles which were case studies [6-34], 19 articles were RCTs [35-53], and 4 articles were UCTs [54-57]. There were 44 studies conducted in Korea, and 10 studies in China. Neurological disorders were the most frequently studied diseases [6,9-12,20-22,25,35,40,49,51,53,55-57], followed by musculoskeletal disorders [15,16,21,23,24,26,29,30,50,52]. Kidney tonification was used in 11 studies [6,9,10,13,17,21,24,31,33,50,57] and was the most frequently studied method followed by gallbladder tonification, which was used in 6 studies [9,21,32,34,40,54]. The most frequently used SDM was directional SDM which was used in 26 studies [11,12,15,18-20,22-26,35-40,42-44,47,48,50,52,54,56], followed by twirling SDM which was used in 7 studies [8,10,16,18,25,37,38].

### Case studies

Of the 29 case studies, 27 were conducted in Korea [6-10,13-34] and 2 were conducted in China [11,12]. A total of 162 cases were reported. Psoriasis [21,28], stroke [6,21], and herniated lumbar

intervertebral disc [10,12] were reported in 2 studies each. Kidney tonification was the most frequently reported method that was used in 9 studies [6,9,10,13,17,21,24,31,33], followed by gallbladder tonification [9,11,21,32,34] and liver tonification [14,20,21,27,28]. Directional SDM was the most frequently used SDM which was used in 11 studies [11,12,15,18-20,22-26], followed by twirling SDM which was used in 5 studies [8,10,16,18,25]. The number of acupuncture treatment sessions ranged from 4 to 87. There were 24 studies [6,8-10,12-19,21-26,28-33] which used other treatments, including body acupuncture, herbal medicine, or pharmacopuncture. Outcome measures varied across studies, and the overall results were generally positive for the treatments. The characteristics of each study are summarized in Table 1.

### Randomized clinical studies

There were 12 RCTs which were conducted in Korea [35-43,45,47,48], and 7 RCTs were conducted in China [44,46,49-53]. Strokes were studied in 5 RCTs [35,36,49,50,53] and were the most frequently studied condition/disease, followed by Hwa-byung, which was reported in 4 studies [39,42,43,48]. Modified methods were used in 4 studies [44,49,51,53], and kidney tonification [46,50], large intestine tonification [50,52], bladder tonification [36,40], pericardium tonification [43,48], and Noyugyogbang [37,47] were used in 2 studies. Directional SDM was used in 13 studies [35-40,42-44,47,48,50,52], and was the most frequently used SDM followed by open-closed SDM which was used in 3 studies [44,50,52]. The number of acupuncture treatment sessions ranged from 1 to 30. Ten studies used additional treatments [35,38-41,45,47,49,51,53], including body acupuncture, herbal medicine, and usual care. Outcome measures varied across the studies, and

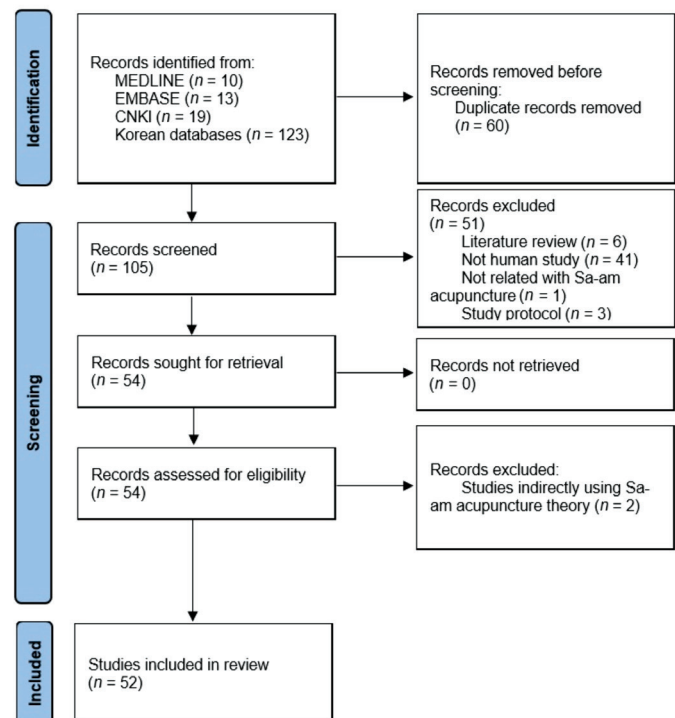


Fig. 1. Preferred reporting items for systematic reviews and meta-analyses flow diagram of the review.

Table 1. Summary of the Included Case Studies.

1 <sup>st</sup> author year [ref] country	Disease or condition	No. of patients	Sa-am acupuncture method (no. of sessions)	SDM	Additional treatments	Outcome measures	Overall results
Park 1975 [6] Korea	Stroke	42	Liver SM, heart SM, spleen TM, lung SM, kidney TM	n.r.	HeM	Effective rate	Positive
Chung 2003 [7] Korea	Hemorrhoid	2	Large intestine TM (7 sessions), large intestine CM (6 sessions)	Kyeong-rak SDM, Nine-six SDM	None	BRS	Positive
Park 2003 [8] Korea	Hemichorea-Hemiballism with diabetes mellitus	1	Liver TM (8 sessions)	Twirling SDM, Nine-six SDM	BA, HeM, conventional medication	Movement of ankle and metatarsal joint	Positive
Cho 2005 [9] Korea	Normal pressure hydrocephalus	Case 1	Gallbladder TM, kidney TM (64 sessions)	n.r.	HeM, moxibustion	5-level rating scale	Positive
		Case 2	Spleen TM, kidney TM (14 sessions)	n.r.	HeM		
Han 2005 [10] Korea	Herniated intervertebral disc of lumbar spine	1	Modified kidney TM (10 sessions)	Twirling SDM	Dong-si acupuncture	SLR test, Bragard test	Positive
Sun 2005 [11] China	Migraine	32	Gallbladder TM (1-10 sessions)	Directional SDM	None	Effective rate	Positive
Quan 2005 [12] China	Herniated intervertebral disc of lumbar spine	50	Large intestine TM (10 sessions)	Directional SDM	BA	Effective rate	Positive
Yang 2007 [13] Korea	Tic disorder with tachycardia	1	Kidney TM	n.r.	BA, HeM	YGTSS	Positive
Kim 2008 [14] Korea	Inflammatory acne	1	Small intestine TM, lung TM (12 sessions)	n.r.	HeM	KAGS	Positive
Lee 2008 [15] Korea	Knee pain after traffic accident	1	Stomach TM (7 sessions)	Directional SDM	HeM, cupping, moxibustion, physiotherapy	VAS, SF-MPQ, ODI, pain drawing	Positive for VAS, ODI, pain drawing, negative for ST-MPQ
Ko 2009 [16] Korea	CRPS type I	1	Liver TM (8 sessions)	Directional SDM	Bee-venom, BA, moxibustion	VAS, DITI, McGill pain questionnaire	Positive for VAS and DITI
Song 2009 [17] Korea	Cancer pain related with colorectal cancer	1	Bladder TM, kidney TM, Pericardium TM, stomach TM, liver TM (8 sessions)	n.r.	HeM	VAS, ECOG performance status	Positive
Jang 2011 [18] Korea	Coldness of both feet	1	Liver TM (7 sessions)	Directional SDM, twirling SDM	HeM, BA electroacupuncture, bee-venom, moxibustion	VAS, verbal scale, CISS, DITI	Positive
Oh 2012 [19] Korea	Meniere's disease	1	Small intestine TM (5 sessions)	Directional SDM	HeM	VAS	Positive
Lee 2012 [20] Korea	Amyotrophic lateral sclerosis	1	Lung TM, heart TM, liver TM (15 sessions)	Directional SDM	None	EtCo2, respiratory rate, SpO2, pulse rate	Positive

Table 1. (Continued).

1 <sup>st</sup> author year [ref] country	Disease or condition	No. of patients	Sa-am acupuncture method (no. of sessions)	SDM	Additional treatments	Outcome measures	Overall results	
Choi 2012 [21] Korea	Case 1	8	Low back pain, arthralgia	Kidney TM (8 sessions)	n.r.	BA	Subjective assessment	Positive
	Case 2		Abnormal heartbeat, fever	Heart CM, Simsinguheo bang, stomach TM (9 sessions)	n.r.	None		
	Case 3		Singultus, insomnia	Liver TM (19 sessions)	n.r.	HeM		
	Case 4		Psoriasis	Small intestine TM, lung TM (8 sessions)	n.r.	Bee-venom, HeM		
	Case 5		Sequelae of stroke	Kidney TM (7 sessions)	n.r.	None		
	Case 6		Chest pain, insomnia	Kiwool bang, triple energizer TM, gall bladder TM (5 sessions)	n.r.	None		
	Case 7		Insomnia	Sanghwa bang, gallbladder TM, Yeoldam bang, heart CM, Aejabjeung bang (142 sessions)	n.r.	None		
	Case 8		Hip arthrosis	Gallbladder TM, small intestine TM, spleen TM, liver TM (13 sessions)	n.r.	BA, pharmacopuncture		
Jeong 2013 [22] Korea	Essential tremor	3	Liver SM	Directional SDM	Pharmacopuncture	NRS	Positive	
Lee 2013 [23] Korea	Calcific tendinitis of supraspinatus tendon	1	Small intestine TM (7 sessions)	Directional SDM, Su-beob SDM	BA, HeM, pharmacopuncture, electroacupuncture	PRS, SPADI, ROM	Positive	
Ji 2014 [24] Korea	Burst fracture	1	Kidney TM (48 sessions)	Directional SDM	HeM	VAS, K-MBI, CR	Positive	
Park 2015 [25] Korea	Lower limb dysesthesia after myelotomy	1	Spleen SM (17 sessions)	Directional SDM, twirling SDM	Bee-venom, cupping, physiotherapy, HeM	SF-MPQ	Positive	
Lee 2015 [26] Korea	Lateral epicondylitis	1	Heart TM (7 sessions)	Directional SDM, Su-beob SDM	BA, infra-red, HeM	VAS, pain-free maximum grip strength, PRTEE	Positive	
Jeon 2016 [27] Korea	Atopic dermatitis	1	Modified lung TM (81 sessions)	n.r.	None	Photographs	Positive	
Jeon 2016 [28] Korea	Psoriasis	1	Modified lung TM (36 sessions)	n.r.	HeM	Photographs	Positive	
Bae 2017 [29] Korea	Ankle pain by contusion	1	Bladder TM (4 sessions)	n.r.	Dong-si acupuncture	VAS	Positive	
Choi 2017 [30] Korea	Shoulder pain	1	Triple energizer TM (3 sessions)	n.r.	BA, infra-red	ROM	Positive	
Lee 2019 [31] Korea	Chronic pompholyx	1	Modified kidney TM	n.r.	HeM	Photographs, subjective assessment	Positive	
Yoon 2020 [32] Korea	Fibromyalgia	1	Small intestine HM, stomach TM, stomach HM, modified methods (12 sessions)	n.r.	HeM	NRS, subjective assessment	Positive	
Byeon 2020 [33] Korea	Chronic allergic contact dermatitis	1	Modified kidney TM (30 sessions)	n.r.	HeM	Photographs, subjective assessment	Positive	
Park 2020 [34] Korea	Oral leukoplakia	1	Gallbladder TM (87 sessions)	n.r.	None	VAS, photographs	Positive	

BA, body acupuncture; BRS, behavioural rating scale; CISS, cold intolerance symptom severity questionnaire; CM, coldness method; CR, compression ratio; CRPS, complex regional pain syndrome; DITI, digital infrared thermal imaging; ECOG, Eastern cooperative oncology group; EtCO<sub>2</sub>, end-tidal carbon dioxide; HeM, herbal medicine; HM, heatness method; K-MBI, K-modified Barthel index; KAGS, Korean acne grading system; n.r., not reported; NRS, numeric rating scale; ODI, Oswestry low-back pain disability index; PRS, pain rating score; PRTEE, patient-rated tennis elbow evaluation; ROM, range of motion; SDM, supplementation and draining method; SF-MPQ, short-form McGill pain questionnaire; SLR, straight leg raise; SM, sedation method; SPADI, shoulder pain and disability index; SpO<sub>2</sub>, peripheral oxygen saturation; TM, tonification method; VAS, visual analogue scale; YGTSS, Yale global tic severity scale.

Table 2. Summary of the Included Randomized Controlled Trials.

1 <sup>st</sup> author year [ref] country	Disease or condition	No. of patients (experimental/control group)	Sa-am acupuncture method (no. of sessions)	SDM	Additional treatments	Control group	Outcome measures	Overall results
Song 2003 [35] Korea	Stroke patients with dysarthria	10/10	Modified method	Directional SDM	HeM	BA	Articulation accuracy, vowel accuracy, alternation, speed of reading the sentence	Significant for articulation accuracy, alternation, and speed of reading sentence
Park 2004 [36] Korea	Hypertension in stroke patients	40/20	Bladder TM (1 session)	Won-bang SDM, directional SDM	None	No treatment	Blood pressure	Significant for lowering blood pressure
Kim 2007 [37] Korea	Fatigue	28/28	Noyugyogbang (8 sessions)	Directional SDM, twirling SDM	None	SA	MFS	Significant at 2nd week
Lee 2007 [38] Korea	Dysmenorrhea	23/26	Small intestine TM (6 sessions)	Directional SDM, twirling SDM	BA	SA	MMP, MMSL	Not significant
Jung 2007 [39] Korea	Hwa-byung	13/13	Heart SM (6 sessions)	Directional SDM	BA	SA	Primary: Likert scale for major symptom of Hwa-byung Secondary: STAXI-K, STAI-K, BDI-K, HRV	Significant for the primary outcome and the expression-control score in STAXI-K
Hong 2007 [40] Korea	Tension-type headache	13/13	Bladder TM, stomach TM with coldness, gallbladder SM, or gallbladder TM (6 sessions)	Directional SDM	BA	SA	VAS, HDI, 6 points Likert scale	Not significant
Kim 2007 [41] Korea	Obesity in female	18 (acupuncture)/18 (SA)/24 (non-treatment)	Spleen SM (12 sessions)	n.r.	Lifestyle guidance	Group 1: SAGroup 2: Lifestyle guidance	Primary: body composition analysis Secondary: blood cholesterol	Not significant
Jung 2008 [42] Korea	Hwabyung	26/26	Heart TM (6 sessions)	Directional SDM	None	SA	Primary: likert scale for major symptom of Hwa-byung Secondary: STAXI-K, STAI-K, BDI-K, HRV	Significant for the expression-control score in STAXI-K
Choi 2011 [43] Korea	Hwabyung	25/25	Pericardium TM (4 sessions)	Directional SDM	None	SA	Likert scale for major symptom of Hwa-byung, STAXI-K, STAI-K, BDI-K	Significant for the likert scale and BDI-K
Cui 2012 [44] China	Constipation in Tae-eum persons	30/30	Modified method (10 sessions)	Directional SDM, open-closed SDM	None	BA	Score of defecation status, ER	Significant for all the outcomes
Jeon 2013 [45] Korea	Diabetic Peripheral neuropathy	6/4	Daily changed on practitioner's discretion	n.r.	Vitamin B12	Vitamin B12	Primary: TTS, MNSIS Secondary: nerve conduction test	Not significant
Cui 2014 [46] China	Dysmenorrhoea in So-yang persons	30/30	Kidney TM	n.r.	None	BA, Warm acupuncture	ER, pain score + medication score	Significant for the pain score + medication score
Kim 2015 [47] Korea	Chronic fatigue syndrome and idiopathic chronic fatigue	51(Sa-am acupuncture)/49(BA)/50(usual care)	Noyugyogbang (10 sessions)	Directional SDM, Nine-six SDM	Usual care	Group 1: BA, Group 2: usual care	Primary: FSS Secondary: SRI, BDI, NRS, EQ-5D	Significant for BDI, and NRS
Choi 2015 [48] Korea	Hwabyung	25/25	Pericardium TM (4 sessions)	Directional SDM	None	SA	Blood pressure, pulse rate, body temperature	Significant for all the outcomes

Table 2. (Continued).

1 <sup>st</sup> author year [ref] country	Disease or condition	No. patients (experimental/control group)	Sa-am acupuncture method (no. of sessions)	SDM	Additional treatments	Control group	Outcome measures	Overall results
Zhu 2016 [49] China	Aphasia after stroke in Tae-eum persons	30/30	Modified method (Lung TM with liver SM, 30 sessions)	n.r.	HeM, BA, language rehabilitation, scalp acupuncture, tongue acupuncture,	Language rehabilitation	CR-RCAE, ER	Significant for all the outcomes
Lin 2016 [50] China	Low back pain in So-yang persons	30/30	Large intestine TM, kidney TM	Directional SDM, open-closed SDM	None	BA	ER	Significant
Pu 2019 [51] China	Depression after stroke in Tae-eum persons	31/31	Modified method (Lung TM with liver SM, 30 sessions)	n.r.	HeM, BA, scalp acupuncture	Western medicine	ER, HAMD	Significant for the HAMD
Lin 2019 [52] China	Leaky shoulder wind	32/32	Large intestine TM	Directional SDM, open-closed SDM	None	BA	ER, pain score, range of motion	Significant for all the outcomes
Li 2020 [53] China	Dysphagia after stroke in So-yang persons	31/31	Modified method (Kidney TM with spleen SM, 30 sessions)	n.r.	HeM, BA, low-frequency electrical stimulation, ice stimulation, oral rehabilitation	Low-frequency electrical stimulation, ice stimulation, oral rehabilitation	WST, SSA	Significant for the SSA

BA, body acupuncture; BDI-K, Beck's depression inventory-K; BDI, Beck's depression inventory; CR-RCAE, China rehabilitation research center aphasia examination; EQ-5D, Euro-QoL-5 dimension; ER, effective rate; FSS, fatigue severity scale; HAMD, Hamilton depression rating scale; HDI, headache disability inventory; HeM, herbal medicine; HRV, heart rate variability; MFS, multidimensional fatigue scale; MMP, measure of menstrual pain; MMSL, menstrual symptom severity list; MNSI, Michigan neuropathy screening instrument; n.r., not reported; NRS, numeric rating scale; SA, sham acupuncture; SDM, supplementation and draining method; SM, sedation method; SRI, stress response inventory; SSA, standardized swallowing assessment; STAI-K, State-Trait anxiety inventory-K; STAXI-K, State-Trait anger expression inventory-K; TM, tonification method; TTS, total symptom score; VAS, visual analogue scale; WST, water swallow test.

the results were generally positive, however, 4 studies reported no significant differences in the measurements [38,40,41,45]. The characteristics of each study are summarized in Table 2.

### Risk of bias of randomized clinical studies

#### 1. Random sequence generation

There were 7 studies which reported an adequate method of random sequence generation and were considered to have a low risk of bias [37,38,41,43,44,47,48]. Eight studies did not report methods of random sequence generation and were considered to have an unclear risk of bias [35,36,39,40,42,45,46,49]. Two studies randomized the participants depending on the time of visit [51,53], and 2 studies randomized the participants depending on the order of visit [50,52], therefore, 4 studies were considered to have a high risk of bias.

#### 2. Allocation concealment

There were 3 studies which reported adequate methods of allocation concealment and were considered to have a low risk of bias [43,47,48]. Sixteen studies did not report methods of allocation concealment and were considered to have an unclear risk of bias [35-42,44-46,49-53].

#### 3. Blinding of participants and personnel

There were 4 studies which reported that they did not use blinding of participants and personnel and were considered to have a high risk of bias [35,36,45,47]. Blinding of participants was performed in 7 studies [37-40,42,43,48] and 7 studies did not report the methods of blinding in the study [44,46,49-53],

consequently, these 14 studies were considered to have an unclear risk of bias. One study reported they used a double-blind method and was considered to have a low risk of bias [41].

#### 4. Blinding of outcome assessment

There were 2 studies which reported blinding the outcome assessment and were considered to have a low risk of bias [43,48]. There were 17 studies which did not report blinding the outcome assessment and were considered to have an unclear risk of bias [35-42,44-47,49-53].

#### 5. Incomplete outcome data

There were 10 studies which reported all participants' data and were considered to have a low risk of bias [43-46,48-53]. Seven studies did not report the number of participants used in the outcome data analysis and were considered to have an unclear risk of bias [35-40,42]. One study did not report all participants' data and was considered to have a high risk of bias [41]. One study used a full analysis set and per-protocol set, and was considered to have an unclear risk of bias [42].

#### 6. Selective reporting

There were 2 articles which were considered as 1 trial and reported different outcome measures [43,48], therefore, were considered to have a high risk of bias. Seventeen studies reported all outcome measures and were considered to have a low risk of bias [35-42,44-47,49-53].

#### 7. Other bias

The included studies appeared to be free of other sources of bias.



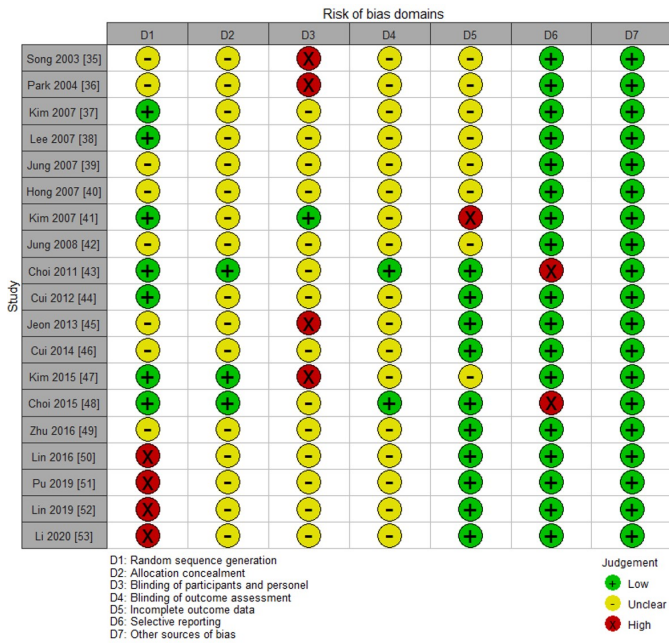


Fig. 2. Risk of bias summary.

The risk of bias for each study is summarized in Fig. 2.

**Uncontrolled clinical studies**

There were 4 UCTs included in this review. Three studies were conducted in Korea [54-56], and 1 study was conducted in China [57]. Insomnia [54], amyotrophic lateral sclerosis [55], post-stroke hemiparesis [56], and migraine [57] were studied and treated with

gallbladder tonification [54], lung tonification [55], liver sedation [56], and a modified method (lung tonification with liver sedation) [57]. Directional SDM was used in 2 studies [54,56], and the number of acupuncture treatment sessions ranged from 3 to 12. Overall, outcomes were generally positive for Sa-am acupuncture treatment. The characteristics of each study are summarized in Table 3.

**Discussion**

Sa-am acupuncture has distinct characteristics compared with conventional acupuncture and is of clinical importance in practices in Korea. However, few clinical studies have been published since the 1<sup>st</sup> case study in this review in 1975 [6]. All the available clinical studies were retrieved, and not only limited to RCTs, so that a comprehensive review of Sa-am acupuncture research could be performed.

Sa-am acupuncture originated in Korea, therefore, the included studies in this review were mostly conducted in Korea. Studies conducted in other countries are necessary to investigate the effect of Sa-am acupuncture in diverse populations and to avoid possible location bias. Moreover, the SDM is a major component in Sa-am acupuncture treatment and could influence the effect of acupuncture [58], however, 40.7% of the studies included in this review did not report the SDM used. Future studies investigating Sa-am acupuncture should report the SDM, and the clinical differences between SDMs should be further investigated.

The case reports in this review showed that Sa-am acupuncture had been generally successful in the treatment of various conditions. However, 24 out of 29 studies reported treatments additional to Sa-am acupuncture and the duration of treatments varied across the studies, therefore, to describe the possible benefit of Sa-am acupuncture from the studies may be misleading. Future case studies need to focus on the specific effect of Sa-am acupuncture and report detailed treatment methods.

The included RCTs attempted to investigate the advantages of Sa-am acupuncture over body acupuncture, usual care, or sham acupuncture. It is encouraging that various diseases have been

Table 3. Summary of the Included Uncontrolled Trials.

1 <sup>st</sup> author year [ref] country	Disease or condition	No. of patients	Sa-am acupuncture method (no. of sessions, if reported)	SDM	Additional treatments	Outcome measures	Overall results
Shin 2004 [54] Korea	Insomnia after traffic accident	20	Gallbladder TM (3 sessions)	Directional SDM, Nine-six SDM	None	Effective rate SMH Hospital questionnaire Korean sleep scale A	Positive
Lee 2013 [55] Korea	Respiratory parameters in amyotrophic lateral sclerosis patients	18	Lung TM (10 sessions)	n.r.	None	EtCO2, SpO2, respiratory rate, pulse rate, ALSFRS	Significant for pulse rate, and SpO2
Baek 2014 [56] Korea	Upper limb spasticity in patients with chronic post-stroke hemiparesis	7	Liver SM (12 sessions)	Won-bang SDM, Directional SDM	None	FMA, MBI, MAS, MI, electromyogram, real-time sonoelastography	Positive for FMA, MAS, MI, muscle spasticity, and muscle thickness
Cui 2015 [57] China	Migraine in Tae-eum persons	92	Modified method (Lung TM with liver SM)	n.r.	HeM	Effective rate, frequency, and severity of migraine	Positive

ALSFRS, amyotrophic lateral sclerosis functional rating scale; EtCO2, end-tidal carbon dioxide; FMA, Fugl-Meyer assessment scale; HeM, herbal medicine; MAS, modified Ashworth scale; MBI, modified barthel index; MI, motricity index; n.r., not reported; SDM, supplementation and draining method; SM, sedation method; SMH, St. Mary hospital; SpO2, peripheral oxygen saturation; TM, tonification method.

studied and those studies have shown generally positive outcomes for Sa-am acupuncture. However, the quality of the RCTs included in this review was low, and it would be inappropriate to report the specific effect of Sa-am acupuncture as beneficial. RCTs with a rigorous design are warranted to support the clinical beneficial effects of Sa-am acupuncture.

UCTs reported positive outcomes of Sa-am acupuncture on several diseases, however, the number of studies was low compared with case studies, and RCTs. More UCTs with detailed description of the Sa-am acupuncture treatment used, such as duration, session numbers, and the SDM used are needed.

This study has some limitations. Since this study aimed to comprehensively review the clinical studies where Sa-am acupuncture was used, meta-analysis for specific conditions or interventions was not conducted. Consequently, the effect of Sa-am acupuncture on a specific condition or disease could not be determined. Additionally, this study did not detail the prescriptions of Sa-am acupuncture for conditions and diseases, because this varied across the studies, and the prescriptions could be different based on pattern diagnosis. Further studies focusing on a particular condition or disease are needed.

In this study, we summarized the clinical studies of Sa-am acupuncture and identified the possible benefits and directions for future Sa-am acupuncture studies. Sa-am acupuncture has been used to treat various diseases, including neurological, musculoskeletal, and psychiatric diseases. However, the specific effect of Sa-am acupuncture has not been clearly described because treatments additional to Sa-am acupuncture have been performed, and various treatment durations have been reported in case studies, and the quality of RCTs was low. Since Sa-am acupuncture is a distinct component in Korean medicine, further studies with rigorous designs and detailed information of the Sa-am acupuncture treatment used are warranted to identify the specific effects and possible clinical benefits of Sa-am acupuncture.

### Conflicts of Interest

The authors have no conflicts of interest to declare.

### Acknowledgments

This study did not receive any grant from funding agencies.

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