

No.	Search strategy	Results
#1	whiplash OR acute whiplash injury* OR acute whiplash associated disorder* OR acute WAD OR acute whiplash associated disorder* II OR acute WAD II OR whiplash associated disorder* OR WAD OR whiplash associated disorder* II OR WAD II, OR whiplash OR whiplash injury* OR whiplash patient* OR whiplash syndrome* OR cervical spine disorder* OR cervical spine injury* OR "Accidents, Traffic" [Mesh] OR (("Motor Vehicles"[Mesh:NoExp] OR "Automobiles"[Mesh] OR "Motorcycles"[Mesh] OR traffic[tiab] OR vehicle[tiab] OR vehicular[tiab] OR car[tiab] OR cars[tiab] OR automobile[tiab] OR automobiles[tiab] OR motorcycle[tiab] OR motorcycles[tiab] OR taxi[tiab] OR cab[tiab] OR road[tiab] OR pedestrian[tiab] OR pedestrians[tiab]) AND (accident[tiab] OR accidents[tiab] OR injury[tiab] OR injuries[tiab] OR crash[tiab] OR crashes[tiab] OR "Wounds and Injuries"[Mesh] OR "injuries"[Subheading])) AND (cervic* OR thoracic* OR lumba*)	24,250
#2	acupuncture	42,653
#3	electroacupuncture	7,448
#4	akupressure	1,832
#5	((((((((((((((((meridian) OR acupoint) OR acupuncture [mh]) OR acupuncture Analgesia [mh]) OR acupuncture Therapy [mh]) OR acupuncture points [mh]) OR acupuncture, ear [mh]) OR acupuncture [Text Word]) OR akupressure [Text Word]) OR electroacupuncture) OR electro acupuncture) OR electro-acupuncture) OR meridian* [Text Word]) OR needling [Text Word]) OR acu-point*) OR acu point* [Text Word]) OR acupoint* [Text Word]) OR Acupuncture [mh]) OR electroacupuncture [mh]) OR acupuncture* [Text Word]) OR elctroacupuncture* [Text Word]) OR (acupuncture AND th[sh]) OR acupuncture[tiab]) OR acupuncture[mh]) OR acupuncture/th[mh]	51,277
#6	#2 or #3 or #4 or #5	54,150
#7	#1 and #6	89
Database: Ovid Medline (ovidsp.ovid.com; 1946-2023)		
1	exp Whiplash Injuries/	3,423
2	whiplash.tw.	3,292
3	acute whiplash injury*.tw.	75
4	acute whiplash associated disorder*.tw.	71
5	acute WAD.tw.	66
6	WAD.tw.	1,038

7	whiplash patient*.tw.	201
8	whiplash syndrome*.tw.	183
9	cervical spine disorder*.tw.	228
10	cervical spine injury*.tw.	1,571
11	exp Accidents, Traffic/	48,509
12	exp Motor Vehicles/	24,289
13	exp Automobiles/	7,798
14	exp Motorcycles/	2,900
15	traffic.tw.	58,851
16	vehicle.tw.	134,582
17	vehicular.tw.	4,046
18	car.tw.	36,938
19	cars.tw.	9,562
20	automobile.tw.	6,526
21	automobiles.tw.	1,392
22	motorcycle.tw.	3,814
23	motorcycles.tw.	931
24	taxi.tw.	1,261
25	cab.tw.	3,755
26	road.tw.	48,507
27	pedestrian.tw.	5,278
28	pedestrians.tw.	3,859
29	accident.tw.	53,887
30	accidents.tw.	48,861
31	injury.tw.	801,932
32	injuries.tw.	254,612
33	crash.tw.	11,757
34	crashes.tw.	9,905
35	exp "Wounds and Injuries"/	1,014,422
36	or/29-35	1,675,831
37	or/11-28	298,607
38	or/1-10	6,385

39	36 and 37	79,754
40	38 or 39	84,652
41	acupuncture.mp.	34,547
42	electroacupuncture.mp.	7,050
43	acupressure.mp.	1,813
44	meridian.mp.	4,833
45	acupoint.mp.	4,164
46	exp acupuncture/	2,043
47	acupuncture.tw.	27,126
48	acupressure.tw.	1,523
49	electro acupuncture.mp.	951
50	meridian*.tw.	6,456
51	needling.tw.	3,936
52	acu-point*.mp.	33
53	acu point*.tw.	33
54	acupoint*.tw.	7,040
55	electroacupuncture*.tw.	1
56	(acupuncture and th).mp.	79
57	or/41-56	44,775
58	40 and 57	120
Database: Embase (embase.com; 1947-2023)		
1	'automobiles'/exp	11,661
2	'motor vehicle'/exp	28,069
3	'accident, traffic'/exp	75,665
4	'motorcycle'/exp	3,664
5	vehicle:ta,ab,de	203,388
6	traffic:ta,ab,de	153,433
7	vehicular:ta,ab,de	4,909
8	car:ta,ab,de	77,435
9	cars:ta,ab,de	12,857
10	automobile:ta,ab,de	7,368
11	automobiles:ta,ab,de	1,524

12	motorcycle:ta,ab,de	5,934
13	motorcycles:ta,ab,de	1,104
14	taxi:ta,ab,de	1,535
15	cab:ta,ab,de	5,070
16	road:ta,ab,de	48,308
17	pedestrian:ta,ab,de	7,726
18	pedestrians:ta,ab,de	4,183
19	accident:ta,ab,de	593,740
20	accidents:ta,ab,de	56,438
21	injury:ta,ab,de	1,928,938
22	injuries:ta,ab,de	280,812
23	crash:ta,ab,de	12,698
24	crashes:ta,ab,de	10,253
25	'wounds and injuries'/exp	2,824,750
26	#19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25	3,658,250
27	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18	427,543
28	#26 AND #27	136,545
29	acupuncture	65,725
30	electroacupuncture	10,710
31	acupressure	3,180
32	acupoint	6,816
33	acupoint:ta,ab,de	6,154
34	'acupuncture analgesia'	2,374
35	'acupuncture therapy'	2,500
36	'acupuncture points'	2,351
37	'acupuncture, ear'	42
38	acupuncture:ta,ab,de	56,629
39	acupressure:ta,ab,de	3,077
40	electroacupuncture	10,710
41	'electro acupuncture'	1,442
42	meridian*:ta,ab,de	9,056

43	needling:ta,ab,de	5,115
44	'acu point*'	50
45	acu AND point*:ta,ab,de	968
46	acupoint*:ta,ab,de	9,351
47	'acupuncture'/exp	57,828
48	'electroacupuncture'/exp	9,355
49	acupuncture*:ta,ab,de	56,660
50	electroacupuncture*:ta,ab,de	10,236
51	acupuncture.:ta,ab,de	56,629
52	#29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51	77,464
53	#28 AND #52	211
Database: The Cochrane Library (thecochranelibrary.com; -2023)		
#1	whiplash	589
#2	acute whiplash injury*	139
#3	acute whiplash associated disorder*	97
#4	acute WAD	113
#5	acute whiplash associated disorder* II	37
#6	acute WAD II	44
#7	whiplash associated disorder*	297
#8	WAD	382
#9	whiplash associated disorder* II	69
#10	WAD II	76
#11	whiplash patient*	426
#12	whiplash syndrome*	98
#13	cervical spine disorder*	605
#14	cervical spine injury*	623
#15	MeSH descriptor: [Accidents, Traffic] explode all trees	547
#16	MeSH descriptor: [Motor Vehicles] explde all trees	361
#17	MeSH descriptor: [Automobiles] this term only	77
#18	MeSH descriptor: [Motorcycles] this term only	35
#19	traffic:ti,ab,kw	2,624

#20	vehicle:ti,ab,kw	8,257
#21	vehicular:ti,ab,kw	56
#22	car:ti,ab,kw	4,202
#23	cars:ti,ab,kw	463
#24	automobile:ti,ab,kw	1,157
#25	automobiles:ti,ab,kw	95
#26	motor cycle*:ti,ab,kw	1,169
#27	taxi*:ti,ab,kw	260
#28	cab*:ti,ab,kw	11,113
#29	road*:ti,ab,kw	2,087
#30	pedestrian*:ti,ab,kw	231
#31	accident*:ti,ab,kw	25,630
#32	injur*:ti,ab,kw	76,691
#33	crash*:ti,ab,kw	773
#34	MeSH descriptor: [Wounds and Injuries] explode all trees	35,004
#35	Any MeSH descriptor in all MeSH products and with qualifier(s): [injuries - IN]	3,961
#36	cervic\$ or thoracic\$ or lumba\$	33,603
#37	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14	1,770
#38	#15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30	28,521
#39	#31 or #32 or #33 or #34 or #35	112,456
#40	#38 and #39	4,739
#41	#37 or #40	6,352
#42	#41 and #36	429
#43	acupuncture	21,079
#44	electroacupuncture	3,539
#45	acupressure	2,174
#46	meridian	1,465
#47	acupoint	3,749
#48	MeSH descriptor: [acupuncture] explode all trees	713
#49	MeSH descriptor: [acupuncture Analgesia] explode all trees	339
#50	MeSH descriptor: [acupuncture Therapy] explode all trees	6,467

#51	MeSH descriptor: [acupuncture points] explode all trees	2,520
#52	MeSH descriptor: [acupuncture, ear] explode all trees	244
#53	acupuncture:ti,ab,kw	19,015
#54	acupressure:ti,ab,kw	2,062
#55	electro acupuncture	1,023
#56	electro-acupuncture	783
#57	meridian*:ti,ab,kw	1,399
#58	needling:ti,ab,kw	3,062
#59	acu-point*	43
#60	acu point*:ti,ab,kw	257
#61	acupoint*:ti,ab,kw	5,508
#62	MeSH descriptor: [electroacupuncture] explode all trees	1,161
#63	electroacupuncture*:ti,ab,kw	4
#64	acupuncture AND th	1,248
#65	#43 or #44 or #45 or #46 or #47 or #48 or #49 or #50 or #51 or #52 or #53 or #54 or #55 or #56 or #57 or #58 or #59 or #60 or #61 or #62 or #63 or #64	26,713
#66	#42 and #65	40
Database: China National Knowledge Infrastructure (CNKI) (cnki.net; 1993-2023)		
1	(SU='traffic accident' OR SU='交通事故' OR SU='whiplash injury' OR SU='颈椎屈伸损伤' OR SU='whiplash associated disorder' OR SU='挥鞭样损伤' OR SU='cervical spine disorder' OR SU='颈椎功能紊乱' OR SU='cervical spine injury' OR SU='颈椎损伤') AND (SU='acupuncture' OR SU='針' or SU='electro acupuncture' OR SU='电針' OR SU='meridian' OR SU='经穴' or SU='acupoint' or SU='acupuncture-ear' OR SU='耳针')	54
Database: ScienceOn (scienceon.kisti.re.kr; 2001-2023)		
1	전체=(교통사고 편타성 손상 채찍질 손상 경향통 경추부 염좌) AND 전체=(침 전침 경혈 이침)	61
Database: KMBASE (kmbase.medric.or.kr; 1985-2023)		
1	[ALL=교통사고]	864

2	[ALL=편타성 손상]	25
3	[ALL=채찍질 손상]	0
4	[ALL=경항통]	89
5	[ALL=경추부 염좌]	4
6	[ALL=침]	14,195
7	[ALL=전침]	377
8	[ALL=이침]	80
9	[ALL=경혈]	326
10	(((ALL=교통사고) OR [ALL=편타성 손상]) OR [ALL=채찍질 손상]) OR [ALL=경항통]) OR [ALL=경추부 염좌])	946
11	(((ALL=침) OR [ALL=전침]) OR [ALL=이침]) OR [ALL=경혈])	14,801
12	((((ALL=교통사고) OR [ALL=편타성 손상]) OR [ALL=채찍질 손상]) OR [ALL=경항통]) OR [ALL=경항통]) AND (((ALL=침) OR [ALL=전침]) OR [ALL=이침]) OR [ALL=경혈])	48
Database: Korean Studies Information Service System (KISS) (kiss.kstudy.com; 1993-2023)		
1	교통사고 and 침	126
2	교통사고 and 전침	4
3	교통사고 and 이침	0
4	교통사고 and 경혈	0
Database: Korea Med (koreamed.org; 1992-2023)		
1	((((("traffic"[ALL]) OR ("automobile"[ALL]) OR ("whiplash injury"[ALL]) OR ("whiplash associated disorder"[ALL]) OR ("cervical spine disorder"[ALL]) OR ("cervical spine injury"[ALL])	1,706
2	((((("acupuncture"[ALL]) OR ("electroacupuncture"[ALL]) OR ("meridian"[ALL]) OR ("acupoint"[ALL])	553
3	#1 AND #2	22

Database: Oriental Medicine Advanced Searching Integrated System (OASIS) (oasis.kiom.re.kr; 1963-2023)		
1	교통사고 침	1
2	교통사고 전침	4
3	교통사고 이침	0
4	교통사고 경혈	0
Database: Research Information Sharing Service (RISS) (riss.kr; 1988-2023)		
1	전체 : 교통사고 <AND> 전체 : 침	92
2	전체 : 교통사고 <AND> 전체 : 전침	4
3	전체 : 교통사고 <AND> 전체 : 이침	0
4	전체 : 교통사고 <AND> 전체 : 경혈	1

Supplemental table S2. Appraisal of acupuncture procedure based on the revised SRICTA criteria (2010)

First author (year)	Type of acupuncture	Acupoints	Depth of needling	Stimulation response	Total sessions	Frequency and Retention
Sterling et al (2015)	General acupuncture	Posterior muscles of the cervical spine and upper thoracic spine	NR	Pecking, Twirling	6	Frequency: 2 times/week X 3 weeks Retention: 30 minute
Tobbackx et al (2012)	General acupuncture	Choose from GV14, C1-C7, GB20, SI11, GB21, TE15, SI14, BL17, SP10, SI3, BL64, TE5, GB41, Shiqizhuixia, Ear Zero point, Ear Jerome point, Ear C0.	NR	Deqi sensation	1	Frequency: 1 time/week X 1 week Retention: 20 minute
Kwak et al (2012)	General acupuncture	SI2, SI3, SI5, SI7, SI14, SI15, LI11, BL10, BL12, BL13, BL14, BL60, BL62, BL66,	1.0-2.0 cm	Deqi sensation, Rotating	6	Frequency: 3 times/week X 2 weeks Retention: 15 minute

		GB20, GB21, GB40, GB41, TE5, TE15				
Tough et al (2010)	General acupuncture	Myofascial trigger points in muscles in and around the neck	NR	Pecking (6-7 times)	2-6	Frequency: 1 time/week X 2-6 times Retention: NR
Aigner et al (1998)	General acupuncture	TB5, SI6 bilaterally	NR	NR	NR	NR
Han et al (2011)	Electroacupuncture	ST25, GB20, GB21, SI11, SI14, SI15, Ashi points	1.0-2.0 cm	Electrical frequency: 300 Hz	8	Frequency: 2 times/week X 4 weeks Retention: 15 minute
Cameron et al (2011)	Electroacupuncture	GB39, GB20, LI14, SI6 bilaterally	1.0-1.5 cm	Electrical frequency: 2-5 Hz Electrical intensity: 1.5 volts	12	Frequency: 2 times/week X 6 weeks Retention: 20 – 60 minutes
Kim et al (2020)	MSAT	3 points at trapezius muscle	0.5-1.0 cm	NR	6	Frequency: 2 times/day X 3 days Retention: 15 minute

STRICTA: Standards for Reporting Interventions in Clinical Trials of Acupuncture; MSAT: Motion-style acupuncture treatment; NR: Not reported

Supplemental table S3. The “leave-one-out” approach for sensitivity analysis of whiplash-associated disorder

Study omitted	Pooled estimate	95% Confidence interval		p-value	<i>I</i> ² (%)
		Lower	Upper		
Pain VAS score					
Kwak HY 2012	-0.54	-0.87	-0.21	0.001	59
Tobbackx Y 2012	-0.65	-0.96	-0.35	<0.0001	44
Tough EA 2010	-0.55	-0.87	-0.22	0.001	59
Cameron ID 2011	-0.65	-1.01	-0.29	0.0005	53
Han SY 2011	-0.47	-0.84	-0.11	0.01	61
Kim DR 2020	-0.45	-0.81	-0.10	0.01	53
ROM – flexion					
Kwak HY 2012	0.33	-0.59	1.26	0.48	89
Sterling M 2015	0.43	-0.37	1.22	0.29	78
Kim DR 2020	-0.10	-0.46	0.26	0.60	0
ROM – extension					
Kwak HY 2012	0.38	-0.19	0.96	0.19	73
Sterling M 2015	0.69	0.34	1.03	<0.0001	0
Kim DR 2020	0.36	-0.27	0.99	0.26	62
ROM – right rotation					
Kwak HY 2012	0.56	-1.16	2.29	0.52	97
Sterling M 2015	0.79	-0.53	2.11	0.24	92
Kim DR 2020	-0.17	-0.56	0.22	0.39	11
ROM – left rotation					
Kwak HY 2012	0.85	-0.29	1.98	0.15	92
Sterling M 2015	0.81	-0.42	2.05	0.20	90
Kim DR 2020	0.23	-0.13	0.59	0.21	0
NDI					
Sterling M 2015	-0.19	-0.61	0.23	0.37	75

Tobbackx Y 2012	-0.18	-0.59	0.24	0.40	75
Tough EA 2010	-0.11	-0.46	0.25	0.56	71
Cameron ID 2011	-0.29	-0.51	-0.08	0.007	0
Han SY 2011	-0.09	-0.45	0.26	0.61	68
Kim DR 2020	-0.15	-0.56	0.26	0.48	73

VAS: Visual analog scale; ROM: Range of motion; NDI: Neck disability index

Supplemental table S4. Evidence quality assessment according to GRADE

Certainty assessment							No. of patients		Effect	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Experimental	Control	Absolute (95% CI)	
Pain VAS score										
6	RCT	Not serious	Serious*	Not serious	Not serious	None	217	206	SMD 0.57 lower (0.86 lower to 0.28 lower)	⊕⊕⊕○ Moderate
ROM-flexion										
3	RCT	Not serious	Very serious§	Not serious	Very serious†	None	108	108	SMD 0.23 higher (0.41 lower to 0.87 higher)	⊕○○○ Very low
ROM-extension										
3	RCT	Not serious	Serious*	Not serious	Serious‡	None	108	108	SMD 0.47 higher (0.05 higher to 0.89 higher)	⊕⊕○○ Low
ROM-right lateral flexion										

2	RCT	Not serious	Very serious [§]	Not serious	Very serious [†]	None	68	69	SMD 0.58 higher (0.31 lower to 1.48 higher)	⊕○○○ Very low
ROM-left lateral flexion										
2	RCT	Not serious	Serious [*]	Not serious	Very serious [†]	None	68	69	SMD 0.61 higher (0 to 1.21 higher)	⊕○○○ Very low
ROM-right rotation										
3	RCT	Not serious	Very serious [§]	Not serious	Very serious [†]	None	108	108	SMD 0.41 higher (0.73 lower to 1.55 higher)	⊕○○○ Very low
ROM-left rotation										
3	RCT	Not serious	Very serious [§]	Not serious	Very serious [†]	None	108	108	SMD 0.63 higher (0.2 lower to 1.46 higher)	⊕○○○ Very low
NDI										
6	RCT	Not serious	Serious [*]	Not serious	Serious [¶]	None	237	225	SMD 0.17 lower (0.51 lower to 0.17 higher)	⊕⊕○○ Low

*: Downgraded one level due to inconsistency (I^2 , 50–75%)

†: Downgraded two levels due to imprecision (fewer than 400 participants and CI overlaps with no effect)

‡: Downgraded one level due to imprecision (fewer than 400 participants)

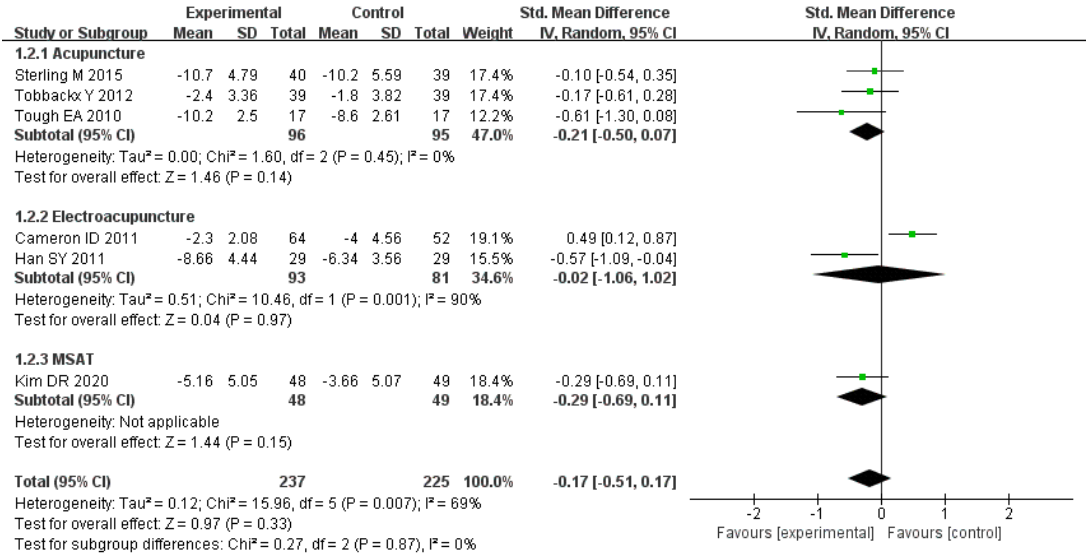
§: Downgraded two levels due to inconsistency (I^2 >75%)

¶: Downgraded one level due to imprecision (CI overlaps with no effect)

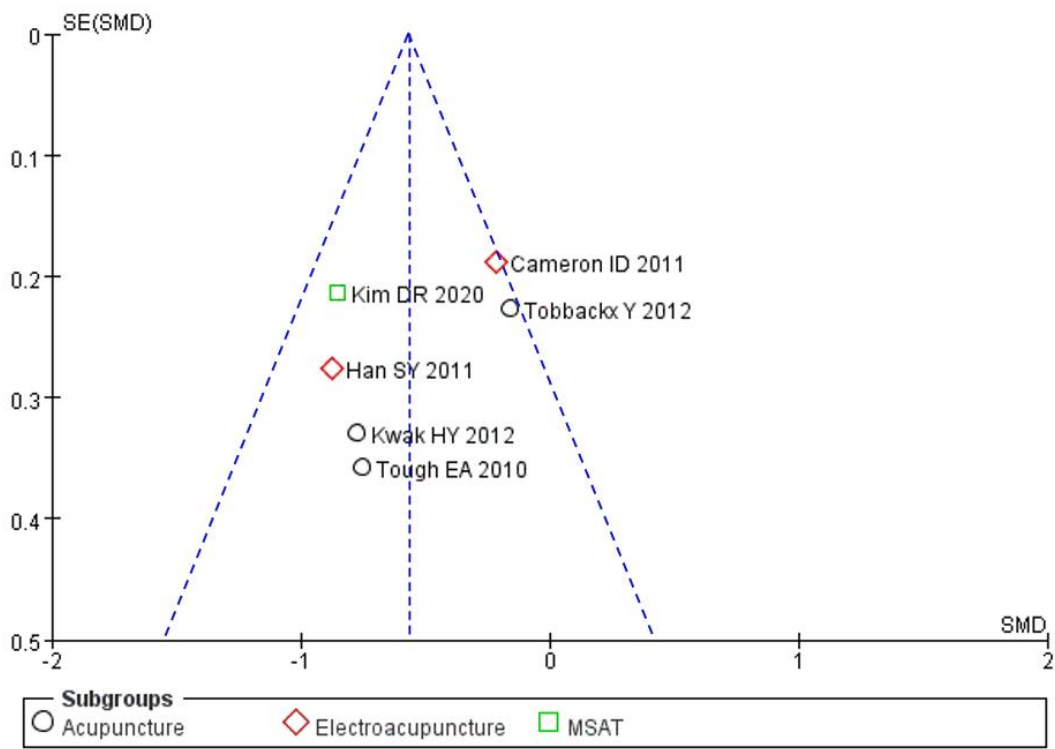
CI: Confidence interval; SMD: Standard mean difference; VAS: Visual analog scale; ROM: Range of motion; NDI: Neck disability index; GRADE, Grading of Recommendations Assessment, Development, and Evaluation

	D1	D2	D3	D4	D5	Overall		
Aigner 1998	!	-	-	-	!	-	+	Low risk
Cameron 2011	+	+	-	+	!	-	!	Some concerns
Han 2011	!	!	+	+	!	!	-	High risk
Kim 2020	+	+	+	+	+	+		
Kwak 2012	+	+	+	+	+	+		
Sterling 2015	+	+	!	+	+	!	D1	Randomisation process
Tobbackx 2012	+	!	+	+	+	!	D2	Deviations from the intended interventions
Tough 2010	+	!	!	+	!	!	D3	Missing outcome data
							D4	Measurement of the outcome
							D5	Selection of the reported result

Supplemental figure S1. Individual data of RoB 2



Supplemental figure S2. Forest plot of the meta-analysis for the neck disability index



Supplemental figure S3. Funnel plot for the pain visual analog scale score