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Original Article

Effect of kinesiotaping on pain relief and upper limb function in stroke survivors: a systematic review and meta-analysis

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Abstract: Objectives: To explore the effects of kinesiotaping in the treatment of shoulder pain and upper limb function in stroke survivors. Methods: PubMed, EMBASE and the Cochrane Central Register of Controlled Trials were electronically and manually searched to identify relevant publications from inception to March 1, 2022. Full-text qualitative studies that explored the effects of kinesiotaping on hemiplegic shoulder pain and poststroke upper limb spasticity were included in the analysis. Data synthesis with a thematic approach was performed to generate descriptive and analytical themes. Results: Nine randomized controlled trials with 253 participants were included. The meta-analysis showed that kinesiotaping significantly reduced poststroke shoulder pain (mean difference (MD) = -1.59, 95% confidence interval (CI): -3.21 to -0.02, P = 0.05), enhanced range of motion (ROM) (MD = 7.00, 95% CI: 2.3 to 11.7, P = 0.004), reduced Modified Ashworth scale (MAS) scores (MD = -0.26, 95% CI: -0.51 to -0.01, P = 0.04), and decreased the magnitude of shoulder subluxation (MD = -0.42, 95% CI: -0.76 to -0.08, P = 0.02). However, outcomes, such as the Fugl-Meyer score and Barthel index, did not differ between the kinesiotaping and control groups. Conclusions: Kinesiotaping effectively relieved shoulder pain, improved upper limb spasticity and ROM, and reduced shoulder subluxation in stroke survivors. However, the effects of kinesiotaping on upper limb function in terms of FMA-UE scores and independence in activities of daily living were not verified. High-quality RCTs designed with large sample sizes are still required in the future.

Keywords: Kinesiotaping, stroke, hemiplegic shoulder pain, activity of daily living

Introduction

Effective treatment of upper limb impairment in patients with hemiplegia is still challenging. One of the common complications is hemiplegic shoulder pain (HSP); according to surveys, HSP occurs in approximately 17-72% of stroke survivors [1, 2] and is always associated with reduced upper limb functional recovery, interference with rehabilitation training and worse quality of life [3]. Another condition, poststroke spasticity, also causes difficulties in obtaining full range of motion (ROM) of the shoulder, elbow, wrist and finger flexors. These limitations further interfere with reach and grasp functions. Treatments to relieve the pain of HSP and reduce spasticity include proper positioning, slings that provide support for the shoulder, acupuncture, functional electrical stimulation, physical therapy, and steroid or Botox injections in the hemiplegic shoulder [4-6]. However, many of the treatments lack sufficient and robust clinical and evidence-based support.

Kinesiotaping (Kinesio tape, or elastic taping) has been extensively used in clinical practice for musculoskeletal disorders in recent decades [7, 8]. Previous reports demonstrated that kinesiotaping could increase blood circulation, provide mechanical support and proprioceptive feedback, improve joint ROM, and activate muscles [9]. Based on these observations, kinesiotaping is considered a potential treatment for HSP and spasticity [10]. However, the effects of kinesiotaping on HSP, spasticity, and upper limb motor function recovery remain controversial, as conflicting evidence has also been reported [11].

One recently published review indicated that various taping methods could effectively reduce shoulder pain and subluxation in participants with hemiplegia [12]. However, this review risked missing some studies and lacked a meta-analysis. Therefore, the current study aimed to verify the effects of kinesiotape on reducing pain and improving upper limb motor function in patients with HSP or poststroke upper limb spasticity through a systematic review and meta-analysis.

Materials and methods

PubMed, EMBASE and the Cochrane Central Register of Controlled Trials were electronically and manually searched to identify relevant publications from inception to March 1, 2022. Randomized clinical trials of kinesiotaping for hemiplegic shoulder pain and poststroke upper limb spasticity were included in the analysis. The key search terms were as follows: "kinesio taping" or "kinesiotaping" or "kinesiotape" and "stroke". There were no restrictions regarding publication date, but the included articles had to be written in English. The search strategy for each database is shown in Supplementary 1.

Two authors (W.J. and Y.S.) independently selected studies for inclusion. In the event of disagreement, the two authors reviewed the original articles together to reach a consensus. The inclusion criteria were as follows: (1) the study type was a randomized controlled trial; (2) stroke patients with upper limb dysfunction (HSP) were included, and the race, nationality, and duration of symptoms of the patients were not limited; (3) the experimental group was treated with kinesiotaping, while the control group was treated with a placebo tape or with conventional physical therapy alone; and (4) the primary outcome measures included ROM of the upper limb joints, pain, Modified Ashworth scale (MAS), and shoulder subluxation, and the secondary outcome measures included the Barthel index (BI) and Fugl-Meyer for upper extremity (FMA-UE) assessment score. Studies that (1) were nonrandomized trials, (2) were repeat publications, (3) had incomplete data, (4) did not provide statistical analysis results and (5) did not report outcomes relevant to pain and upper limb function were excluded from consideration.

Two coauthors (G.J. and B.T.) independently extracted data from the included studies. A standardized data extraction sheet was used for original data extraction from each study, and disagreements were resolved by discussion. Information on the following items was extracted: first author's name, publication year, country of study, characteristics of the patients, sample size of the studies, characteristics of the kinesiotaping intervention (protocol and duration), outcome measures (pain, MAS, ROM, FMA-UE, Barthel Index, and shoulder subluxation) and results.

The risk of bias in the randomized controlled trials that were included was assessed using the Cochrane Collaboration's Risk of Bias tool [13], which examines whether the random allocation method is correct, whether the allocation scheme is hidden, whether the blinding method is used, whether the presented data are complete, whether there is selective reporting of the research results, and whether there are other sources of bias. Two coauthors (W.J. and Y.S.) independently performed the risk of bias assessment of the randomized controlled trials that were included. In the event of disagreement, the two coauthors reviewed the original article together to reach a consensus. The methodological quality using the PEDro scale was shown in Supplementary 2.

Based on the available evidence, the main outcome (pain score) and the secondary outcomes (e.g., ROM, MAS) were amenable to meta-analysis. All statistical analyses were performed using RevMan 5.4 (Cochrane Collaboration, Copenhagen, Denmark). Statistical heterogeneity was assessed by the I^2 index, with significant heterogeneity defined as an I^2 value of greater than 50% and a P value of less than 0.05 [14]. The random-effects model was used in the presence of significant heterogeneity [15]. Otherwise, the fixed-effects model was used if there was no heterogeneity ($I^2 \leq 50\%$ and P value of less than 0.05). The weighted mean difference (WMD) with 95% confidence intervals (CIs) was used for the summary statistics and derived for comparison of the kinesiotaping and control groups. A P value less than 0.05 was considered statistically significant.

Results

We retrieved 154 articles from the original literature searches. From an initial set of 71 nonduplicate records, nine studies were finally included in the current meta-analysis based on

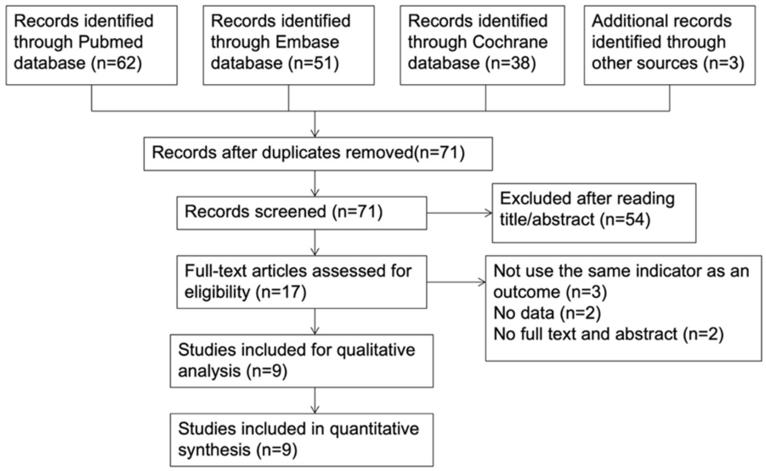

Figure 1. Flowchart of the inclusion and exclusion of studies.

the inclusion and exclusion criteria (see **Figure 1** for a flowchart of study selection).

A total of 253 participants in the six pooled randomized controlled trials were included; of these participants, 128 participants underwent a kinesiotaping intervention (experimental group) and the other 125 patients underwent conventional physical therapy (including sham tape, electronic stimulation or acupuncture) alone (control group). One paper compared the effects of kinesiotaping with those of acupuncture [16]. Three trials compared kinesiotaping and fake tape [17-19], and three randomized controlled trials compared kinesiotaping and conventional training [16, 20, 21]. Six studies explored the effects of kinesiotaping on shoulder pain [16-20, 22]. The intervention duration also varied among the 9 included studies [16-24], ranging from 3 to 24 weeks. The characteristics of the participants, interventions and main outcomes are shown in **Table 1**. The results of the risk of bias assessment are summarized in **Figure 2**.

Primary outcome

Pain: Six studies included in the investigation focused on the effects of treatment on pain relief. Four of the studies used visual analog scales to measure pain intensity [16, 17, 21, 22], and two used digital rating scales [18, 19]. The results showed that kinesiotaping significantly relieved shoulder pain in stroke patients (MD = -1.59, 95% CI: -3.21 to -0.02, P = 0.05). Sensitivity analysis indicated that the results were not changed after excluding any given trial (**Figure 3**).

Secondary outcomes

ROM: Patients in the kinesiotaping group achieved remarkable improvement in shoulder ROM (MD = 7.00, 95% CI: 2.3 to 11.7, P = 0.004) and reduced MAS (MD = -0.26, 95% CI: -0.51 to -0.01, P = 0.04) compared with those in the control groups. Subgroup analysis demonstrated that kinesiotaping significantly enhanced shoulder flexion in six trials [17-20, 22, 23] and shoulder internal rotation in 2 trials [17, 18]. However, other motions, such as shoulder abduction, shoulder extension, shoulder external rotation and elbow extension, did not obviously change (**Figure 4**).

Modified Ashworth scale: Three studies provided analyzable data regarding the modified Ashworth scale score [17, 20, 23]. The results showed that kinesiotaping effectively reduced spasticity (MD = -0.26, 95% CI: -0.51 to -0.01, P = 0.04). Subgroup analysis showed an obvious reduction in the modified Ashworth scale score during shoulder adduction after kinesiotaping (**Figure 5**).

Subluxation: Three studies were included in the meta-analysis [17-19], and the results showed that kinesiotaping significantly relieved shoulder subluxation in hemiplegia patients compared with control patients (MD = -0.42, 95% CI: -0.76 to -0.08, P = 0.02) (**Figure 6**).

Functional outcomes: A meta-analysis of three studies (three reporting the Fugl-Meyer score and two reporting the Barthel index) [16-18, 24] showed that kinesiotaping did not improve upper limb function, as assessed by the Fugl-Meyer score or the modified Barthel Index, compared with the control treatment (**Figure 7**).

Discussion

Based on our meta-analysis, compared with sham taping or conventional rehabilitation training, kinesiotaping provided significant pain

Table 1. Characteristics of studies using kinesiotape to treat the upper extremities of stroke patients

Author/year/ region	Clinic condition	Participant characteristics	Intervention and duration	Outcomes and follow-up
Hochsprung et al. [16]/*2017/ Spain*	Acute stroke.	KT group (n = 7) 6 males Age = 63 ± 11.6 Control group (n = 7) 5 males Age = 63.7 ± 6.1 NMES group (n = 7) 2 males Age = 60.8 ± 13.2	KT: over the anterior, medial and posterior deltoid muscles. Duration: 6 days/week for 4 weeks. Control group: conventional approach with the treating physiotherapist.	VAS, BI, Berg scale, and ARAT were assessed 24 h post-stroke (baseline), and at 1, 2, 3, 4, 12, 24 weeks after baseline.
Huang et al. [17]/*2016/ Taiwan*	Subacute stroke (< 3 months). Diagnosed as HSP.	KT group (n = 21) 15 males Age = 60.4 ± 11.8 Control group (n = 23) 15 males Age = 62.2 ± 9.6	KT: from the medial border of the scapula to the deltoid tuberosity of the humerus and acted on the deltoid and supraspinatus muscles. Duration: 5 days/week for 3 weeks. Control group: sham KT with neutral tension which applied from the clavicular angle to the medial epicondyle of the humerus.	VAS, MAS, ROM, FMA-UE, MBI, SSQOL, and subluxation were assessed pre- and posttreatment. No longer follow up.
Huang et al. [18]/2017/ *Taiwan*	Stroke patients within 6 months prior to discharge. Diagnosed as HSP.	KT group (n = 11) 8 males Age = 56 ± 13 Control group (n = 10) 6 males Age = 59 ± 13	KT: over the supraspinatus, biceps and deltoid muscles, radial tuberosity and acromioclavicular joint. Duration: 3 consecutive days, twice/week for 3 weeks. Control group: sham KT, similar taping patterns, but without tension, did not cover the joints.	NRS, SPADI, ultrasonography, and PROM were assessed pre- and posttreatment. No longer follow up.
Yang et al. [19]/2018/ *China*	Stroke patients within 1~6 months. Diagnosed as HSP with a period of more than 1 month.	KT group (n = 10) 7 males Age = 59 ± 3.2 Control group (n = 9) 6 males Age = 60 ± 2.3	KT: over the deltoid, supraspinatus, and teres minor with approximately 25-50% of the full available tension. Duration: 10~12 hours/day, 5 days/week for 4 weeks. Control group: placebo taping (without tension).	NRS, shoulder subluxation, AROM, and muscle activity were assessed at baseline, 1 day and 4 weeks after the intervention. No longer follow up.
Pillastrini et al. [20]/2015/ *Italy*	Chronic stroke within 1 to 8 years. Diagnosed as HSP.	KT group (n = 16) 13 males Age: 66 ± 8 Control group (n = 15) 9 males Age = 66 ± 11	Neuromuscular taping (NMT): over the pectoralis major, deltoids and supraspinatus. Duration: 5 days/week for 4 weeks. Control group: standard physical therapy alone.	VAS, ROM and MAS were assessed before and after the intervention with a follow-up at 4 weeks.
Huang et al. [21]/2019/ *Taiwan*	Subacute stroke within 6 months.	KT group (n = 18) 8 males Age: 51 ± 16.5 Control group (n = 13) 16 males Age: 50 ± 15.5	KT: proximal one-third of the forearm to the wrist and then was split into 5 straps into the distal interphalangeal joint of five fingers. Duration: 7 days/week for 3 weeks. Control group: regular rehabilitation 5 days a week for 3 weeks.	MAS, FMA-UE, Brunnstrom stage, and STEF were assessed before the KT intervention, right after the KT intervention and two weeks later.
Kwon et al. [22]/2003/ *Korean*	Stroke at least 6 months.	KT group (n = 27) 17 males Age = 59.22 ± 9.85 Control group (n = 27) 19 males Age = 59.63 ± 8.00	KT: affected area and the point of pressure pain. Duration: the tape lasts for 3 days/week, twelve weeks. Control group: regular rehabilitation.	VAS and ROM were assessed.
Moise et al. [23]/2018/ *BRAZIL*	Stroke at least 6 months.	KT group (n = 8) 4 males Age = 59.5 ± 10.8 Control group (n = 8) 4 males Age = 56.0 ± 13.1	KT: over the triceps-brachial and wrist and finger extensors of the paretic upper limb for 2 days, right after the acupuncture session. Duration: the tape stayed on the patient's arm until the next acupuncture session. Control group: acupuncture three times a week for 12 sessions.	MAS, AROM, and WMFT were assessed before the first and after the last (4 weeks) intervention session.
Hsieh et al. [24]/2021/ *Taiwan*	Patient of stroke with hemiplegia for 3-12 months.	KT group (n = 10) 7 males Age (median, IQR) = 57 (17) Control group (n = 13) 7 males Age (median, IQR) = 55 (5)	KT: from the dorsal side of the forearm and divided into five equal bars to the distal interphalangeal joint of each finger. Duration: 5 days/week last for 3 weeks. Control group: sham KT.	mTS, BBT, FMA-UE, and SIS were assessed at baseline, after intervention with a follow-up at 3 weeks.

BI: Barthel index; OA: objective assessment; FMA-UE: Fugl-Meyer assessment for upper extremity; MAS: modified Ashworth scale; KT: Kinesiotape/Kinesiotaping; ACP: acupuncture; ROM: range of motion; mTS: modified Tardieu scale; BBT: Box and Block test; STEF: Simple Test for Evaluating Hand Function; WMFT: Wolf Motor Function Test.

relief of the upper limb for stroke patients. This is consistent with our initial hypothesis. However, kinesiotaping had no significant effect on upper limb functional improvement, as indicat-

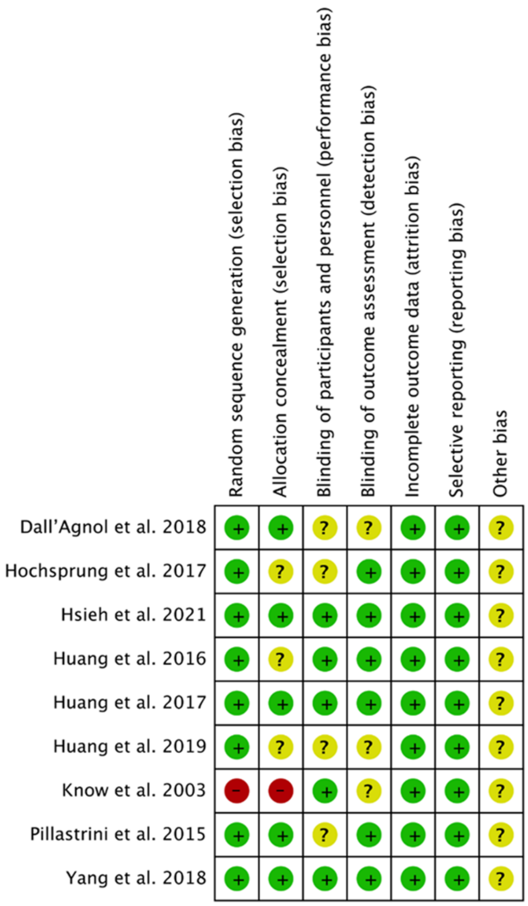

Figure 2. Summary of risk of bias assessment of the included studies.

ed by changes in the Fugl-Meyer score and Barthel index.

Pain in the hemiplegic shoulder restricts upper limb recovery and is the main complaint of stroke patients. Kinesiotaping not only provides mechanical support due to the pressure and stretching exerted by the tape but also accelerates blood circulation and stimulates the nervous system, thus reducing pain [25]. The origins of hemiplegic shoulder pain could include both neurological and mechanical factors [26]. In the subacute and chronic stages poststroke, spasticity not only increases muscle tension and pain but also causes resistance to movement [27]. Typically, for hemiplegic shoulders, increased activity of the pectoralis, subscapularis and teres major inhibits active and passive abduction, extension, and external rotation at the shoulder [4]. Our study showed that kinesiotaping effectively reduces spasticity during shoulder abduction and elbow flexion, as assessed by the modified Ashworth scale. Therefore, it is not surprising that, according to our analysis, kinesiotaping significantly improved the range of shoulder flexion and abduction. However, no significant relief was observed during shoulder extension, internal/external rotation or elbow extension. This result might have occurred because in most cases, the tape was placed on the supraspinatus and deltoid, both of which are needed for shoulder flexion and abduction [11]. In the studies that were included in our analysis, the taping technique varied in terms of the type of tape used, the duration of the taping intervention and the tension applied [16-23]. Future studies should compare taping techniques.

Disruption of the integrity of the glenohumeral joint is known as shoulder subluxation and is recognized as a common mechanical contributor to hemiplegic shoulder pain [28, 29]. Displacement of the humeral head may damage the nerves and rotator cuff. Therefore, previous reports indicated that improvement of subluxation directly relieves pain [28]. Our results indicated that kinesiotaping exerts therapeutic effects by improving subluxation, with low heterogeneity (I^2 = 0%) and high reliability (P = 0.02).

Lindgren and colleagues reported that loss of upper limb function is a predictor of shoulder pain [1]. Patients with pain may refuse active and/or passive training of the hemiplegic shoulder, causing joint stiffness. Moreover, shoulder subluxation and spasms generate a vicious cycle that worsens upper extremity function. Yang et al. reported that kinesiotaping enhanced motor function recovery [19]. However, we did not observe functional improvement in hemiplegia patients after kinesiotaping, as assessed by the Barthel index and Fugl-Meyer assessment. The Barthel index is an ordinal scale for measuring independence in activities of daily living (ADL) and is generally used to assess stroke patients [30]. Thus, general functioning was less likely to be affected by kinesiotaping. The Fugl-Meyer assessment was designed to monitor motor function in hemiplegia patients and requires high levels of coordination involving the shoulder, elbow and wrist [31, 32]. Therefore, it is unlikely to reflect the effects of a kinesiotaping intervention. Future clinical trials need to pay more attention to the assessment of functional recovery in the upper extremities poststroke.

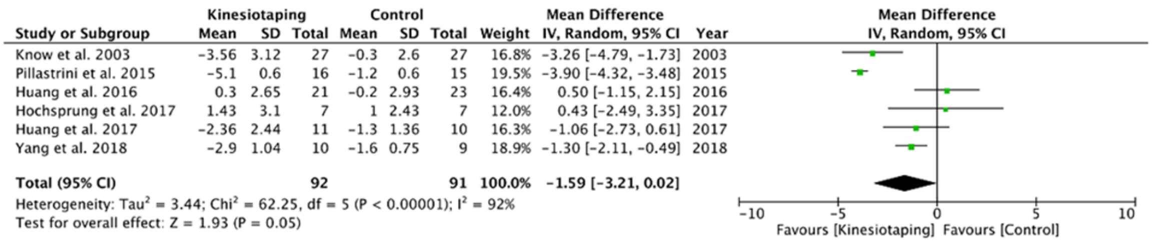

Figure 3. Meta-analysis of randomized controlled trials evaluating the effects of kinesiotaping on pain relief.

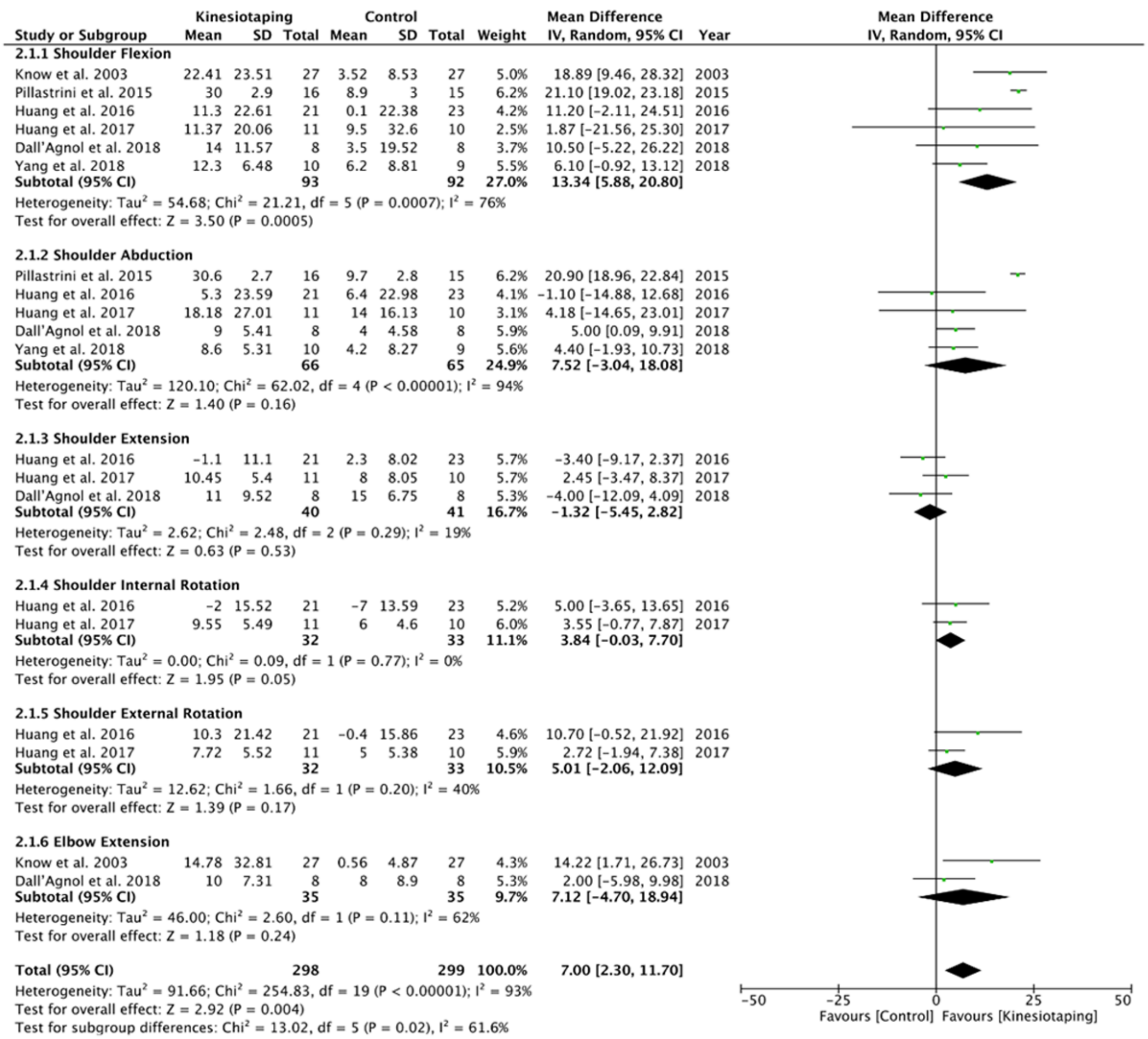

Figure 4. Meta-analysis of randomized controlled trials evaluating the effects of kinesiotaping on shoulder range of motion.

It should be noted that there are limitations in the current study. First, most of the included trials were from single centers and had a low number of participants (less than 20 in each group in most studies); thus, publication bias exists. Second, all the randomized controlled trials were designed differently and implemented in different settings, for different durations and with different control interventions. These differences might have arisen due to the absence of specific guidelines for kinesiotaping in the treatment of neurological diseases.

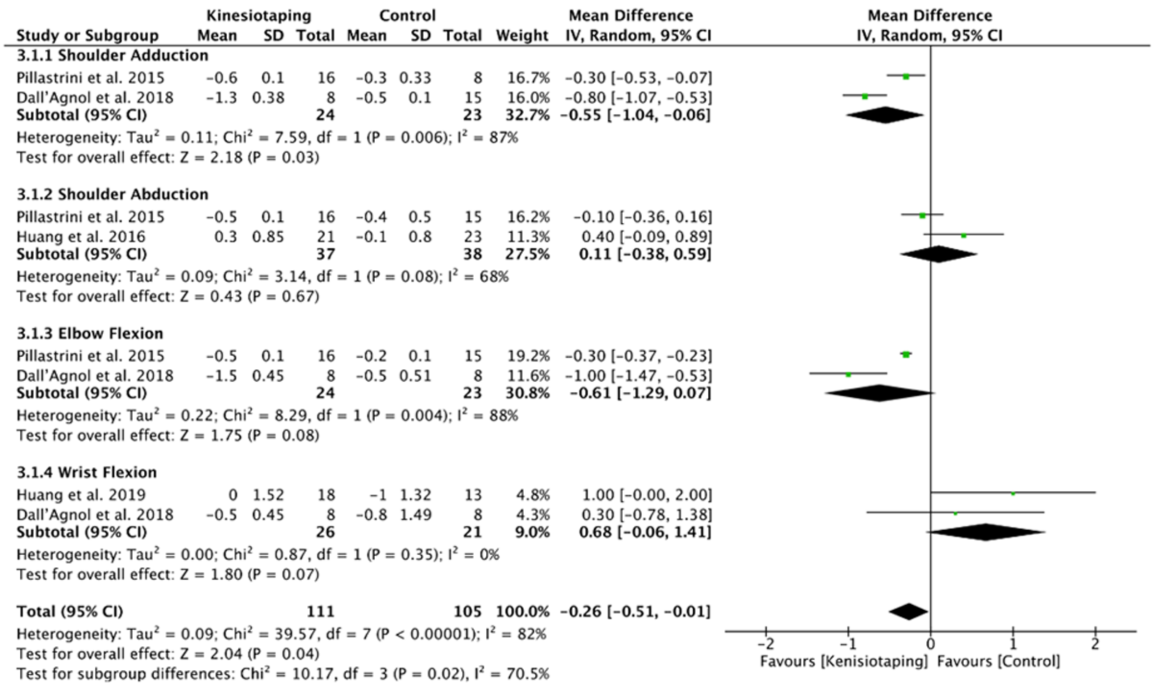

Figure 5. Meta-analysis of randomized controlled trials evaluating the effects of kinesiotaping on modified Ashworth scale scores.

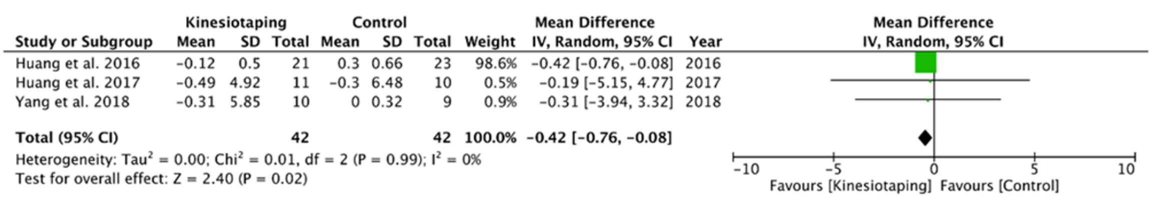

Figure 6. Meta-analysis of randomized controlled trials evaluating the effects of kinesiotaping on shoulder subluxation.

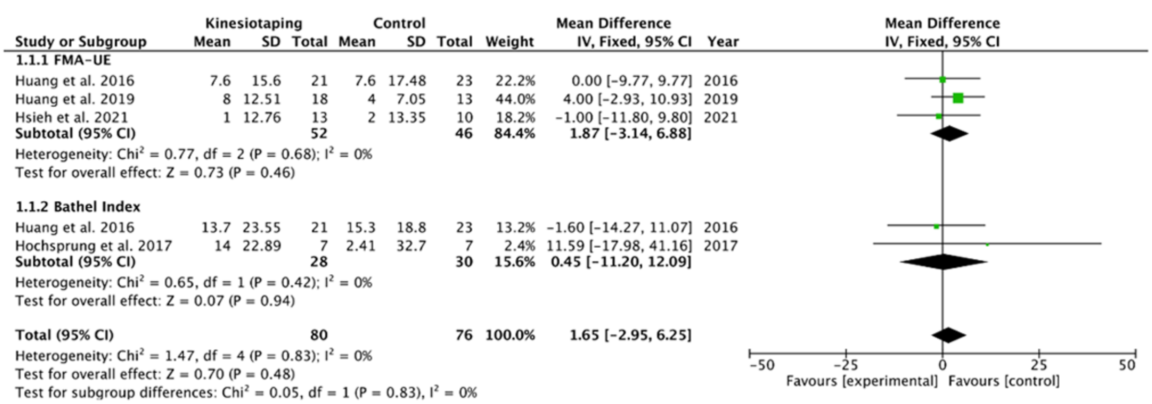

Figure 7. Meta-analysis evaluating the effects of kinesiotaping on the Fugl-Meyer score and the Barthel index.

Third, the diversity of measurements could have induced corresponding heterogeneity.

Our study provides result similar to that of two recently published reviews that KT is effective for relieving pain and improving shoulder subluxation [33, 34]. However, our data cannot demonstrate that kinesiotaping effectively improves upper limb function (FMA-UE) and ADL in stroke patients. The reason might be that we did not include studies published in Chinese or that included inelastic taping interventions [35, 36]. Technically, inelastic tape or rigid strapping tape should not be considered as kinesiotaping. Nevertheless, kinesiotaping is still recommended for improving hemiplegic upper limb function in clinical practice. Multicenter and large-sample randomized controlled trials are still needed in the future to provide higher-quality evidence for clinical practice.

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Disclosure of conflict of interest

None.

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Supplementary 1. Search strategy

PubMed, Embase and Cochrane search strategies for effects of kinesiotaping on relieving the pain in stroke patients

Database	PubMed
Strategy	#1 and #2
#1	(((“kinesio” [All Fields] and ((((“tapes” [All Fields] or “taped” [All Fields]) or “tapes” [All Fields]) or “taping” [All Fields]) or “tapings” [All Fields])) or ((((“athletic tape” [MeSH Terms] or (“athletic” [All Fields] and “tape” [All Fields])) or “athletic tape” [All Fields]) or “kinesiotape” [All Fields]) or “kinesiotaping” [All Fields])) or ((“kinesiology zagreb” [Journal] or “kinesiology” [All Fields]) and ((((“tapes” [All Fields] OR “taped” [All Fields]) or “tapes” [All Fields]) or “taping” [All Fields]) or “tapings” [All Fields])))
#2	(((((“stroke*” [All Fields] or (“Cerebrovascular” [All Fields] and “accicent” [All Fields])) or ((“cerebrovascular disorders” [MeSH Terms] or (“Cerebrovascular” [All Fields] and “disorders” [All Fields])) or “cerebrovascular disorders” [All Fields])) or ((((“brain infarction” [MeSH Terms] or (“brain” [All Fields] and “infarction” [All Fields])) or “brain infarction” [All Fields]) or (“brain” [All Fields] AND “infarctions” [All Fields])) or “brain infarctions” [All Fields])) or ((“brain stem infarctions” [MeSH Terms] or ((“brain” [All Fields] and “stem” [All Fields]) and “infarctions” [All Fields])) or “brain stem infarctions” [All Fields])) or ((“cerebral infarction” [MeSH Terms] or (“cerebral” [All Fields] and “infarction” [All Fields])) “cerebral infarction” [All Fields]))
Database	Embase
Strategy	#1 and #2
#1	(‘kinesio taping’/exp or ‘kinesio taping’ or (kinesio and (‘taping’/exp OR taping)) or ‘kinesiotaping’/exp or kinesiotaping or ‘kinesiology taping’/exp or ‘kinesiology taping’ or ((‘kinesiology’/exp OR kinesiology) and (‘taping’/exp OR taping)))
#2	(stroke* or ‘cerebrovascular accicent’ or (cerebrovascular and accicent) or ‘cerebrovascular disorders’/exp or ‘cerebrovascular disorders’ oR (cerebrovascular and (‘disorders’/exp or disorders)) OR ‘brain infarctions’ or ((‘brain’/exp OR brain) and infarctions) or ‘brain stem infarctions’/exp or ‘brain stem infarctions’ or ((‘brain’/exp OR brain) and (‘stem’/exp OR stem) and infarctions) or ‘cerebral infarction’/exp or ‘cerebral infarction’ or (cerebral and (‘infarction’/exp OR infarction)))
Database	Cochrane
Strategy	#1 and #2
#1	(kinesio taping or kinesiotaping or kinesiology taping):ti,ab,kw
#2	(Stroke* or Cerebrovascular accicent or Cerebrovascular Disorders or Brain Infarctions or Brain Stem Infarctions or Cerebral Infarction):ti,ab,kw

Pubmed:

Translations

Taping: “tape’s” [All Fields] or “taped” [All Fields] or “tapes” [All Fields] or “taping” [All Fields] or “tapings” [All Fields]

Kinesiotaping: “athletic tape” [MeSH Terms] or (“athletic” [All Fields] and “tape” [All Fields]) or “athletic tape” [All Fields] or “kinesiotape” [All Fields] or “kinesiotaping” [All Fields]

Kinesiology: “Kinesiology (Zagreb)” [Journal:__jid9715460] or “kinesiology” [All Fields]

Cerebrovascular Disorders: “cerebrovascular disorders” [MeSH Terms] or (“cerebrovascular” [All Fields] and “disorders” [All Fields]) or “cerebrovascular disorders” [All Fields]

Brain Infarctions: “brain infarction” [MeSH Terms] or (“brain” [All Fields] and “infarction” [All Fields]) or “brain infarction” [All Fields] or (“brain” [All Fields] and “infarctions” [All Fields]) or “brain infarctions” [All Fields]

Brain Stem Infarctions: “brain stem infarctions” [MeSH Terms] or (“brain” [All Fields] and “stem” [All Fields] and “infarctions” [All Fields]) or “brain stem infarctions” [All Fields]

Cerebral Infarction: “cerebral infarction” [MeSH Terms] or (“cerebral” [All Fields] and “infarction” [All Fields]) or “cerebral infarction” [All Fields]

Supplementary 2. Table methodological quality of the included studies. (PEDro)

ID	Author	1	2	3	4	5	6	7	8	9	10	11	score
16	Hochsprung (2017)	Yes	1	1	1	0	0	1	1	0	1	1	7
17	Huang (2016)	Yes	1	0	1	1	0	1	0	1	1	1	7
18	Huang (2017)	Yes	1	1	1	1	1	1	0	1	1	1	9
19	Yang (2018)	Yes	1	1	1	1	1	1	1	0	1	0	8
20	Pillastrini (2015)	Yes	1	1	1	0	0	1	1	1	1	1	8
21	Huang (2019)	Yes	1	0	1	0	0	1	1	1	1	1	7
22	Kwon (2003)	Yes	0	0	1	1	0	1	1	0	1	1	6
23	Dall’Agnol (2018)	Yes	1	1	1	0	0	0	1	1	1	1	7
24	Hsieh (2021)	Yes	1	1	1	0	1	1	1	1	1	1	9

Notes: 1, Eligibility criteria (the item does not contribute to the total score, *This score has been confirmed*); 2, Random allocation; 3, Concealed allocation; 4, Baseline comparability; 5, Blind subjects; 6, Blind therapists; 7, Blind assessors; 8, Adequate follow-up; 9, Intention-to-treat analysis; 10, Between-group comparisons; 11, Point estimates and variability.