Efficacy of Kinesio Taping Compared to Other Treatment Modalities in Musculoskeletal Disorders: A Systematic Review and Meta-Analysis

Running title: Efficacy of Kinesio Taping in musculoskeletal disorders

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Abstract

Kinesio taping is used in a wide variety of musculoskeletal conditions. We performed a systematic review and meta-analysis on the efficacy of kinesio taping in musculoskeletal disorders compared to other interventions. Twelve electronic databases were used for the systemic search and data relevant to pain and disability were extracted. The protocol was registered in PROSPERO (CRD42018087606). Meta-analysis was performed to compare the efficacy of kinesio taping to other modalities of musculoskeletal pain and disability. As a result, 36 studies were included in the quantitative analysis. Kinesio taping was found to provide an improvement of both pain and disability when applied to any region of the body. In the first five days of application, Kinesio taping significantly reduced the pain in all body regions (SMD=-0.63, 95%CI: -0.87, -0.39). This was also noted after four-to-six weeks of application (SMD=-0.76, 95%CI: -1.07, -0.45). When kinesio taping was used for disability in low back pain patients, it significantly reduced the disability within five days of application (SMD=-0.70, 95%CI: -1.29, -0.11). Finally, kinesio taping has shown an improvement of the disability in all body regions after four-to-six weeks of application (SMD=-0.59, 95%CI: -0.96, -0.22). Our findings support kinesio taping as an adjuvant to other treatments for musculoskeletal pain and disability.

Keywords: Kinesio taping; pain; disability; physiotherapy; rehabilitation.

Introduction

Studies support the notion that globally, musculoskeletal (MSK) disorders are the second leading cause of disability; however, these disorders are often disregarded due to low mortality rates (Storheim & Zwart, 2014). In recent years, global burden studies have placed a greater emphasis on epidemiology, risk factors, and management of MSK disorders. As rates of obesity, lack of exercise, and aging increase, we observe a positive correlation to the rates of MSK disability, which in 2010 increased by 45% and are expected to continue increasing along with this trend (Hoy, March, et al., 2014; Hoy, Smith, et al., 2014). When analyzing causes of MSK pain; notably, low back pain is ranked as the highest reason for disability and ranks sixth for overall patient burden. Thereby following the aforementioned trend; namely in its relation to age as the most critical risk factor, as we observe the greatest prevalence in older age groups and regions with higher life expectancies (Woolf & Pfleger, 2003). Neck pain osteoarthritis, rheumatoid arthritis, and gout follow back pain in their levels of incidence. The increased incidence of MSK disorders raises a significant issue regarding economic impact, specifically MSK conditions cost US$ 213 billion – 1.4% of the gross domestic product in 2011 (Briggs et al., 2018).

The high burden of disability related to MSK disorders serves as the impetus towards more research in the field to decrease disability and improve overall quality of life. Among the many guidelines for the management of MSK disorders, notable milestones include pharmacological treatment, manual manipulation, electrotherapy, and physical activity (Madan & Grime, 2015). Medical treatment inclusive of muscle relaxants, and anti-inflammatory medications are effective; however, with long-term use, we often see significant adverse side effects. Hence, providing support for the argument in favor of using other therapeutic modalities for MSK disorders. These modalities work by focusing on the mechanical forces on the muscle which send signals to peripheral nerves and the central nervous system in an overall effort to relieve pain and relax the muscles.

Kinesio Taping (KT) stands out as one such modality proposed to manage MSK disorders. First developed in the 1970s by Dr. Kenzo Kase, it was its re-introduction at the 2008 Beijing Olympics that has allowed KT to since gain popularity (Kase et al., 1998; Williams et al., 2012). It is touted for pain relief, increased range of motion (ROM), and muscle relaxation. As such, it is widely used, not only among athletes but also in clinical medicine. Kinesio taping's primary mechanism emphasizes the activation of inactive muscle as well as the balance

between muscle activation in synergistic and antagonistic muscles (Kase et al., 1998). Once attached to the location of interest, KT also stimulates proprioception by enhancing the joint alignment, and in turn, unloads the tension and irritability of the nerves. KT has a facilitatory and an inhibitory effect on the muscle, both of which are dependent on the method of KT application to the muscle across the joints. Commonly, the tape is applied from muscle origin to insertion and in doing so, when applied under tension, exerts an excitatory effect. On the other hand, KT's inhibitory effect is exerted via its application by reversing the direction of the tape's placement with origin and insertion in addition to stretching the tape to 120% on relaxed skin (Fukui et al., 2017).

Studies surrounding kinesiology tape application provide controversial results regarding its efficacy according to the location, severity, and duration/timing of use in MSK disorders. For instance, Kaya *et al.* discuss the use of KT for shoulder impingement syndrome, and results demonstrated that it was most effective when used within the first week post-presentation, and as such, is recommended for cases in which urgent relief of symptoms is indicated (Kaya et al., 2011). Conversely, Thelen *et al.* argue that KT, when used for shoulder pain specifically, results in only minor improvement with regards to ROM while its efficacy on pain-free ROM is indeed proven after initial taping but not in long-term pain relief (Thelen et al., 2008). This controversy in option is further supported by a few studies, trials, and research that differ in their conclusions surrounding the efficacy of kinesiology tape. Namely, a trial utilizing KT for lateral epicondylitis found that there is no significant effect on pain regardless of the tape's application method (Shakeri et al., 2018). A systematic review found that KT lacked efficacy in clinical practice regardless of the affected joint (Kalron & Bar-Sela, 2013). Furthermore, a study suggested that the use of KT in combination with targeted shoulder exercise aids in the relief of shoulder impingement syndrome (Kaya et al., 2011). Comparable results were noted in a meta-analysis conducted by Ghozy *et al.* in which they concluded that combination therapy of exercise and KT results in major recovery of shoulder pain and disability (Ghozy et al., 2020).

Our study sought to systematically review and identify the efficacy of KT across the spectrum of MSK disorders. We compare KT's efficacy to other mainstay treatment methods either as a singular therapy or in combination with another form of treatment. Ultimately our findings will aid clinicians in their decision-making surrounding kinesiology tape, its effectiveness, and indications for use depending on the affected joint.

Methods

Protocol development and registration

This study followed the suggestion of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher et al., 2009). The protocol was established and registered on the International Prospective Register of Systematic Reviews (PROSPERO) with ID number CRD42018087606 (Nguyen Tien Huy, 2018). The results were reported based on the updated PRISMA checklist - Supplementary Table 1.

Search strategy

A systematic literature search of twelve electronic databases was conducted in January 2018. Databases inclusive of PubMed, Google Scholar, ISI Web of Science, Scopus, metaRegister of Controlled Trials (mRCT), WHO Global Health Library (WHO GHL), Clinicaltrials.gov, Virtual Health Library (VHL), System for Information on Grey Literature Report in Europe (SIGLE), New York Academy of Medicine Grey Literature Report (NYAM), POPLINE, and the WHO International Clinical Trials Registry Platform (ICTRP) were utilized in the searching.

Using the keywords (Kinesio OR kinesiology OR kinesiological) AND (pain OR painful) AND (randomized OR randomised OR random OR randomly OR randomization) AND (RCT or trial), we were able to recognize and compile the relevant reports. We also examined the citations of the included articles, references of relevant studies in PubMed, as well as correspondent citations in Google Scholar. Moreover, a manual search was conducted to look for any possible missing articles or new relevant studies. Three independent reviewers have reviewed the abstracts and full-text articles of the potential studies and compared them against our pre-defined inclusion/exclusion criteria. Any disagreement was resolved through discussion between the reviewers and any further disagreement was discussed with a senior member.

Eligibility criteria

The inclusion criteria were applied as followed: all human randomized trials (RCTs) that compared KT technique with other MSK pain relief regardless of race, age, sex, language, socioeconomic status, ethnicity, geographical area/place, and publication date. The reports from which there was not extractable data, duplicate studies, unreliable or incomplete data were excluded. Exclusion criteria included reports published in conference proceedings,

commentaries, editorial, letters, discussions, books, or book chapters. The overlapped data sets were assessed by senior members of our team who made the final decision on article inclusion.

Data extraction

The primary data sheet was created via pilot extraction from the two most relevant references then data was compiled on Microsoft Excel. Three researchers then independently extracted data into the template. After discussion and consultation with the supervisor (NTH), a final review and consensus were established. The extracted data included the authors' name, publication year, journal, authors' country, patients' country, patient's age, patient's sex, number of patients enrolled in the study.

Use of the visual analog scale (VAS), ROM, numeric pain rating scale, degree of proprioception, static balance, and active balance were all measures that were recorded pre- and post-application of KT in various body areas.

Quality assessment

Each RCT was independently assessed by three reviewers for quality using the Cochrane collaboration's tool for assessing the risk of bias (Higgins et al., 2011). This tool utilizes seven major domains in the assessment of bias inclusive of sequence generation, allocation concealment, blinding of outcome assessment, blinding of participants and personnel, selective outcome reporting, incomplete outcome data, and other sources of bias. Each reviewer independently evaluated against these domains and their risk of bias was determined as 'low' 'high' or 'unclear'. Any incongruity was discussed between the two reviewers and finalized by the supervisor (NTH).

Meta-analysis

Statistical analysis was conducted by computing all variables into standardized mean difference (SMD). The corresponding 95% confidence interval (CI) of the polled effect size was also calculated using a fixed-effects or random-effects model based on the level of heterogeneity. If there was a lack of significant heterogeneity, a fixed-effects model was utilized. Heterogeneity was assessed via Q statistics and the I^2 test. I^2 value > 50% or P-value < 0.10 was considered statistically significant.

Assessment of publication bias was conducted utilizing the Egger's regression test and was represented graphically by Begg's funnel plot when ten or more studies were used (Begg &

Mazumdar, 1994; Peters et al., 2006). P-value < 0.10 was considered significant on analysis via Egger's regression test. Typically, when publication bias is identified, the trim and fill method of Duvall and Tweedie is performed to include studies that appeared to be missing to enhance the symmetry (Duval & Tweedie, 2000). The meta-analysis was conducted using R software version 4.0.2 (R Core Team, 2013) and the packages used were "meta" (Balduzzi et al., 2019), "metaphor" (Viechtbauer, 2010), and "dmetar" (Harrer et al., 2019).

Results

Literature search and study characteristics

The database search yielded a sum of 1,070 initial reports. Using EndNote X9 software, we removed 585 articles as duplicates. Out of the 485 articles included for title/abstract screening, only 129 were included for full-text screening before their inclusion in the final data synthesis. The sum of articles included from the database search was 42 articles. Upon inclusion of four additional papers from the manual search, 46 articles matched all our inclusion criteria, with only 36 studies included in the quantitative analysis. Six of the qualitative studies could not be included in the meta-analysis because the time of outcome assessment did not comply with the times, we chose for our analysis. As for the other five studies, they were solitary regarding the body part and the time of assessment; hence the numbers were not combinable. The PRISMA flow diagram of our screening and selection process was illustrated in Figure 1.

Our study included 2,670 patients with different MSK disorders. We included 14 studies that tested the efficacy of KT in low back disorders. Five studies assessed the efficacy of KT in the face and jaw and one study assessed its efficacy in the chest region, while 16 studies investigated the efficacy of KT in the neck and upper limb region. Concerning the lower limb (excluding the knee region) and the knee, three and seven studies were included, respectively. Detailed characteristics of included studies were presented in Table 1.

Quality assessment results

Our quality assessment has revealed that about 75% of the included studies presented a low risk of both selection and attrition bias. However, about 50% of the included studies reported a high or unclear risk of reporting, performance, and detection bias (Figure 2). Detailed risk of bias for each study is presented in Supplementary Table 1.

Efficacy of KT in reducing the pain within five days of application

Our meta-analysis included 22 studies. Based on their findings, we found that KT has a significant effect on pain reduction within five days of its application (SMD=-0.63, 95%CI: -0.87, -0.39). The most significant effect was recorded when KT is applied to both the neck and upper limbs (SMD=-0.96, 95%CI: -1.45, -0.47), as well as the low back (SMD=-0.55, 95%CI: -0.81, -0.29). On the other hand, the least significant effect was noted in both face and jaw (SMD=-0.27, 95%CI: -0.75, 0.21), in addition to the knee (SMD=-0.62, 95%CI: -1.36, 0.13) (Figure 3). Significant heterogeneity was noted (I^2=51%, p<0.01). Egger's regression test revealed no publication bias (p=0.633).

Efficacy of KT in reducing the pain after four to six weeks of application

Seventeen studies were included in this meta-analysis. Concluding this analysis, we have found that KT has a significant effect on pain reduction after four-to-six weeks of application (SMD=-0.76, 95%CI: -1.07, -0.45). The most significant effect was recorded when KT is applied to both lower limb (excluding the knee) (SMD=-1.30, 95%CI: -1.57, -1.03), neck and upper limb region (SMD=-0.83, 95%CI: -1.64, -0.01), and low back (SMD=-0.62, 95%CI: -1.12, -0.12). On the other hand, an insignificant effect was noted in the knee (SMD=-0.38, 95%CI: -0.92, 0.16) (Figure 4). Significant heterogeneity was noted (I^2=82%, p<0.01). Egger's regression test has revealed no publication bias (p=0.492).

Effect of KT on the disability within five days of application

Six studies were included in this meta-analysis. Based on their findings, we have concluded that KT has a significant impact on reducing the disability within five days of application in the low back part (SMD=-0.70, 95%CI: -1.29, -0.11) (Figure 5). Significant heterogeneity was noted (I^2=84%, p<0.01).

Effect of KT on the disability after four-to-six weeks of application

Eleven studies were included in this meta-analysis. Based on their findings, we have concluded that, generally, KT has a significant impact on reducing the disability after four-to-six weeks of application (SMD=-0.59, 95%CI: -0.96, -0.22). We also found that the greatest significant effect was recorded when KT is applied to the low back (SMD=-0.76, 95%CI: -1.37, -0.15). On the other hand, the least/insignificant effect was noted in both neck and upper limb, and the knee with (SMD=-0.49, 95%CI: -1.09, 0.11) and (SMD=-0.28, 95%CI: -0.74, 0.18), respectively (Figure 6). Significant heterogeneity was noted (I^2=52%, p=0.03). When

performing Egger's test, significant heterogeneity was elaborated (p=0.081). Accordingly, the trim-and-fill method was applied with two added studies (Supplementary Figure 3).

Qualitative analysis of the effect of KT on pain

Five studies were included in the qualitative analysis, and they investigated the effect of the KT application on pain at different time points. First, concerning the face and jaw, two studies demonstrated the efficacy of KT against the control group (Bae, 2014; Coskun Benlidayi et al., 2016). A study comparing KT with exercise against exercise only has found that KT in conjunction with exercise, decreased the pain at one week and six weeks with SMD -0.106 and -0.356, respectively (Coskun Benlidayi et al., 2016). Another study performed in Korea has reached the same conclusion when assessing the efficacy of KT using the visual analog score (VAS) (SMD=-1.617) (Bae, 2014). Second, only one study has investigated the effect of KT against placebo in reducing chest pain after lobectomy for lung cancer (Imperatori et al., 2016). Third, two studies have investigated the effect of KT on reducing low back pain (Araujo et al., 2018; Atici et al., 2017). One of these studies has shown that KT with tension and home exercises is better than KT alone in scoliosis cases (SMD=-1.093) (Atici et al., 2017). Araujo et al. have demonstrated that KT and Skin convolution is better than using KT only (SMD=-0.283) (Araujo et al., 2018).

Qualitative analysis of the effect of KT on disability

Eight studies were included in the qualitative analysis and they investigated the effect of the KT application on disability at different time points. First, concerning the face and jaw, only one study has demonstrated the efficacy of KT and exercise against the exercise-only group after one week of intervention (SMD=-1.147) (Coskun Benlidayi et al., 2016). Second, three studies have investigated the efficacy of KT in improving the disability in the region of the neck and upper limb. The first study conducted by Ay *et al.* found that KT is better than sham taping in treating the disability caused by cervical myofascial pain syndrome after 2 weeks of intervention (SMD=-0.611) (Ay et al., 2017). The second study was conducted by Shakeri *et al.* and they found that when KT is combined with tension exercises, it achieves better results in treating the disability caused by lateral epicondylitis than KT only treatment (SMD=-0.537) (Shakeri et al., 2018). The third study conducted by Saavedra-Hernandez concluded that KT is better than cervical thrust manipulation in dealing with disability caused by mechanical neck pain after 1 week of KT application (SMD=-0.099) (Saavedra-Hernandez et al., 2012). Third, four studies investigated the use of KT in decreasing disability in the low back region. A study

conducted by Forozeshfard compared KT against a group not using KT; he concluded that the KT group has achieved better results after three days (SMD=-0.223) (Forozeshfard et al., 2016). Another study by Junior *et al.* found that when KT is compared to either micropore or a placebo, KT has shown better results in reducing the disability caused by chronic non-specific low back pain after two and three days of KT application (Luz Junior et al., 2015). Added *et al.* have found that when KT is combined with exercise, they have demonstrated better results, than KT alone, in reducing the disability caused by chronic low back pain after 5, 12, and 24 weeks of intervention (Added et al., 2016). Finally, in the same year a study by Araujo *et al.* has found that treating chronic non-specific low back pain using KT and skin convolution achieved better outcomes when used against KT only (SMD =-0.169) (Araujo et al., 2018).

Discussion

Our results suggest the superiority of KT when compared to other adjuvant therapies. KT was found to provide an improvement of both pain and disability when applied to any region of the body. In the first five days of application, KT has significantly reduced the pain in all body regions -neck, upper limbs, knee, lower limbs, and low back- (SMD=-0.63, 95%CI: -0.87, -0.39). This was also noted after four-to-six weeks of application (SMD=-0.76, 95%CI: -1.07, -0.45). When KT was used for disability in low back pain patients, it has significantly reduced the disability within five days of application (SMD=-0.70, 95%CI: -1.29, -0.11). Lastly, KT has shown an improvement of the disability in all body regions after four-to-six weeks of application (SMD=-0.59, 95%CI: -0.96, -0.22)

The suggested mechanism of reducing pain for KT is that it lifts the skin of the joint or muscle of interest, thereby allowing for better circulation and lymph drainage. It acts by relieving the tension on the sensory receptors. The mechanism differs for MSK disability, as it is found that KT acts through supporting and increasing the electrical activity of the muscles (Bagheri et al., 2018).

The efficacy of KT for jaw pain and disability is supported by Bae *et al.*; the ROM of the temporomandibular joint and sternocleidomastoid muscles were significantly improved. They recommend that KT should be used on the latent myofascial trigger points (Bae, 2014). Coskun Benlidayi *et al.* deduces that KT significantly decreases pain and disability in temporomandibular disorders. This contrasts with our results, which found that KT only improves pain (Coskun Benlidayi et al., 2016). This effect of action in improving disability was investigated by Ginszt *et al.* who found that KTs application on the trapezius muscle

decreased the electrical activity of masticatory muscles (Ginszt et al., 2016). Baltacı *et al.* found that there was no significant effect on muscle pain and muscle fatigue as evidenced by electromyography (Baltacı et al., 2011). This was further supported by Ristow *et al.* who did not find any significant change in pain levels of patients with a mandibular fracture but found enhanced mouth opening in the KT group along with less swelling and edema (Ristow et al., 2013).

In patients with neck myofascial pain, Ay *et al.* found that KT statistically improved the pressure pain threshold and cervical ROM but not cervical rotation and cervical lateral flexion (Ay et al., 2017). Ozturk *et al.* found that KT significantly improved trapezius muscle pain and strength (Ozturk et al., 2016). Gonzalez-Iglesias *et al.* reported improvement of neck pain within the first 24 hours post-acute neck whiplash injury; however, results were not statistically significant (Gonzalez-Iglesias et al., 2009). Saavedra-Hernandez *et al.* suggested that the improvement in the KT group is mainly attributed to the placebo effect (Saavedra-Hernandez et al., 2012).

Our study found an improvement of upper limb pain but not the MSK disability. Atya *et al.* results supported our study as they only found a significant effect of KT on shoulder pain but not the disability (Atya et al., 2017). Also, Thelen *et al.* inferred from their results that KT provided pain improvement immediately, but this improvement was not persistent after six days (Thelen et al., 2008). This was supported by Kaya *et al.* who found that KT is excellent adjuvant therapy for both disability and pain within a short duration, but this improvement was not significantly different from the control group after two weeks (Kaya et al., 2011). This was also proven by Lee *et al.* who found that KT improved the delay of muscle soreness in the brachialis muscle (Lee et al., 2015). In contrast to our studies, Hsu *et al.* found that KT enhanced the trapezius activity which decreased the disability in patients with shoulder impingement syndrome (Hsu et al., 2009).

Concerning knee joint pain and disability, our study did not find a significant decrease in pain or disability. However, Aytar *et al.* found that in the case of patellofemoral pain syndrome, KT improved muscle strength but not the pain itself. It is not only the knee joint pain that KT cannot improve but it also exhibits weak efficacy over the pain of the Achilles tendinitis (Aytar et al., 2011). Anandkumar *et al.* investigated the efficacy of KT on the quadriceps torque in Knee osteoarthritis and found that KT with tension enhanced the peak quadriceps torque and standardized stair-climbing task (Anandkumar et al., 2014). In contrast, Wageck *et al.* found

no significant effect of KT on knee osteoarthritis pain or disability (Wageck et al., 2016). In addition, Mutlu *et al.* emphasized that the KT improved the visual analog scale during activity and walked scores even after one month of application in knee osteoarthritis patients (Mutlu et al., 2015). However, it produced short-term improvement of walking tasks, pain, and knee-flexion ROM. They did not find any significant improvement of the muscle strength in the gluteus medius, quadriceps femoris, and hamstring muscles.

In our study, KT reduced the spine pain but not the disability. This was supported by Paoloni *et al.* who found that KT application improved pain in both phases I and II but not the disability in patients with chronic lumbar pain patients (Paoloni et al., 2011). Imperator *et al.* reported that chest pain; after lobectomy in lung cancer, was significantly decreased in the KT group (Imperatori et al., 2016). Furthermore, the efficacy of the KT persisted after 30 days, unlike other studies that did not find any effect of KT after one week (Kaya et al., 2011; Thelen et al., 2008). Kachanathu *et al.* compared KT versus physical therapy for non-specific lumbar pain and found no significant difference between both modalities (Kachanathu et al., 2014). The physical therapy group had better pain-reducing properties and muscle strengthening. Another study by Mazloum *et al.* found that the application of KT with tension did not differ much from its application without tension; thereby questioning the mechanism by which the KT decreased pain in previous studies (Mazloum, 2017).

In contrast, Parreira Pdo *et al.* did not find a significant improvement of low back pain after four weeks of KT application compared to placebo (Parreira Pdo et al., 2014). Kelle *et al.* revealed that KT improved pain and disability earlier on in patients with non-specific low back pain than compared to the control group (Kelle et al., 2016). However, the significant improvement of disability was no longer present after four weeks. This was supported in Castro-Sánchez *et al.* who found that significant improvement of pain was of short duration and disappeared after four weeks (Castro-Sanchez et al., 2012). The efficacy of the KT for the spine was not limited only to the low back pain but extended to improve pain in adults with idiopathic scoliosis (Atici et al., 2017; Mohamed et al., 2016). Furthermore, Alvarez-Alvarez *et al.* found that KT enhanced the time to failure in extensor muscles of the trunk and decreased muscle fatigue (Alvarez-Alvarez et al., 2014).

Comparison of KT to different treatment modalities yielded contradicting results. Fong *et al.* compared KT to exercise and found that exercise had a better effect over KT for better muscle activity (Fong et al., 2015). Talu *et al.* compared KT with exercise to exercise alone in lumbar

region pathologies and found that adding KT to exercise significantly decreased the pain more than exercises alone (Talu et al., 2016). This was supported by other studies, which compared conventional physical therapy with KT to conventional physical therapy in chronic low back pain and found that the first group had significant improvement of pain and disability up to six months (Added et al., 2016; Bharti et al., 2015). Also, Sedhom *et al.* compared aescin and diethylamine salicylate gel pH to KT in knee osteoarthritis and found that medical gel significantly enhanced the pain more than KT (Gaid Sedhom, 2016). Hayta *et al.* compared pain relief and disability enhancement in myofascial pain patients between KT and dry needling (Hayta & Umdu, 2016) and concluded that both groups had significant improvement of pain that was persistent up to 12 weeks. However, the dry needling significantly improved disability and ROM in the neck region and when compared to placebo, KT always significantly improved pain and disability. Studies comparing sham taping and KT also showed significant efficacy of KT over sham taping. However, one study suggested that this effect over sham taping is mainly attributed to the method of application. When applying the sham taping with the same method as KT, both had the same efficacy.

Regarding the effect of duration, there have been contradicting results that KT has only short-term efficacy lasting for a maximum period of one week. Other studies found that the effect of KT can extend up to three months. We noticed that a significant effect of duration was evident in all MSK injuries except in the shoulder.

The main limitation of this study is the different approaches to KT application, the differing pathologies underlying each MSK disorder account for significant heterogeneity, and the limited number of studies in each pathology. These limitations did not allow for comparing the efficacy for different pathologies. Another limitation is the use of different outcome measures or scales. Finally, 17 studies were included in the qualitative data synthesis only as they did not provide appropriate control groups or used different time intervals, unlike the other studies.

Conclusions

Our study suggests that KT can be used as an adjuvant to other therapeutic modalities for relieving both MSK pain as well as disability. These effects were observed for both short and long terms. However, we believe that the results of our study should be interpreted and used cautiously due to the mentioned limitations. We further conclude that studies with more rigorous methodologies and adequate sample sizes are needed to reach a certain consensus.

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List of abbreviations:

KT = Kinesio taping

MSK = musculoskeletal

SD = standard deviation

CR = conventional rehabilitation

NDI = Neck Disability Index

NPS = Numerical Pain Scale

CTM = Cervical Thrust Manipulation

PIR = Post-isometric muscle relaxation

NPRS = Numerical Pain Rating Scale

OA = osteoarthritis

ROM = Range of motion

VAS = visual analogue scale

VAS-W = visual analogue scale-worst pain

VAS-U = visual analogue scale-usual pain

VAS-R = visual analogue scale-resting pain

VAS-A = visual analogue scale-activity pain

VAS-N = visual analogue scale-night pain

NPDS = Neck Pain Disability Scale

QA = Quality assessment

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Supplementary Table 2. Summary of the results of both qualitative and quantitative data synthesis

Table 1. Baseline characteristics of the included studies.

Author/Year/Country	Sample Size (n= 2670)	Treatment group			Control group			Follow-up duration	Pain scale	Disability scale	Data Synthesis
		Intervention	Sample Size	Age (mean±SD)	Intervention	Sample Size	Age (mean±SD)				
A. Characteristics of studies involving the neck and upper limb region											
El-Abd/2016/Egypt (El-Abd et al., 2017)	46	KT	23	27.18±3.63	Correction exercises	23	27.35±3.63	4 weeks	NA	NDI	Quantitative
Homayouni/2013/Iran (Homayouni, 2013)	60	KT	30	45.2±2.2	Physiotherapy	30	46±1.3	4 weeks	VAS	NA	Quantitative
Shakeri/2017/Iran (Shakeri et al., 2018)	30	KT with tension	15	37.6±11.56	KT without tension	15	31.62±11.43	1 week	VAS	DASH	Qualitative
Pelosin/2013/Italy (Pelosin et al., 2013)	12	KT	6	55.83±9.0	Sham taping	6	55.83±9.0	4 weeks	VAS-U	NA	Quantitative
Lee/2015/Korea (Lee et al., 2015)	37	KT	18	22.5±1.4	Control	19	23.5±1.2	1 day	VAS	NA	Quantitative
Halski/2015/Poland (Halski et al., 2015)	49	KT	25	20.6±1.5	Sham taping	24	19.9±0.8	1 day	VAS	NA	Quantitative
Ptaszkowski/2015/Poland (Ptaszkowski et al., 2015)	52	KT	26	Mean 20.4	Post-isometric muscle relaxation (PiRT)	26	Mean 20.6	1 day	VAS	NA	Quantitative
Gonzalez-Iglesias/2009/Spain (Gonzalez-Iglesias et al., 2009)	41	KT	21	33	Sham taping	20	32	1 day	NPS	NA	Quantitative
Saavedra-Hernandez/2012/Spain	76	KT	40	44±10	Cervical thrust manipulation (CTM)	36	46±9	1 week	NPS	NDI	Qualitative

(Saavedra-Hernandez et al., 2012)											
Chang/2014/Taiwan (Chang et al., 2014)	50	KT with pain relief method	26	33±9	KT with placebo method	24	32±6	Immediately post-interventional and 1-day post-intervention	VAS	NA	Qualitative
Ay/2015/Turkey (Ay et al., 2017)	61	KT	31	44.80±17.19	Sham taping	30	44.10±17.45	2 weeks	VAS	NPDS	Qualitative
Copurgensli/2016/Turkey (Copurgensli et al., 2016)	45	KT with conventional rehabilitation	15	52.06±6.54	Conventional Rehabilitation	15	49.86±7.19	4 weeks	VAS	NDI	Quantitative
					Mobilization	15	48±7.21				
Hayta/2016/Turkey (Hayta & Umdu, 2016)	55	KT	27	Range 20 to 60	Dry needling	28	Range 20 to 60	4 weeks	VAS	NDI	Quantitative
Kavlak/2012/Turkey (Kavlak et al., 2012)	40	KT	20	47.35±12.94	Classic therapy	20	47.4±9.11	1 day	VAS	NDI	Quantitative
Kilinc/2015/Turkey (Kilinç et al., 2016)	28	KT	14	25.72±8.39	Mobilization	14	30.29±12.92	4 days	VAS	NA	Quantitative
Pekyavas/2014/Turkey (Pekyavas et al., 2014)	28	KT	14	56.5±9.4	Bandage only	14	49.6±10.5	4 weeks	VAS	NA	Quantitative
B. Characteristics of studies involving the face and TMJ											
Ristow/2013/Germany (Ristow et al., 2013)	26	KT	13	43.8±20.7	Control	13	42.5±16.7	1 day	VAS	NA	Quantitative
Bae/2014/Korea (Bae, 2014)	42	KT	23	22.8±3.2	Control	19	23.3±2.7	2 weeks	VAS	NA	Qualitative
Capo-Juan/2016/Spain (Capó-Juan et al., 2017)	50	KT	25	Mean 36.92	Placebo	25	Mean 38.8	1 day	NPS	NA	Quantitative

Azatcam/2016/Turkey (Azatcam et al., 2017)	69	KT with exercises	23	37.13±9.96	Transcutaneous electrical nerve stimulation (TENS) with exercises	23	41.56±9.5	1 day	VAS	NDI	Quantitative
					Exercise group	23	36.34±10.1				
Benlidayi/2016/Turkey (Coskun Benlidayi et al., 2016)	28	KT with exercises	14	31.6±11.5	Exercises	14	31.1±10.1	1 and 6 weeks	VAS	RDC/TMD II	Qualitative
C. Characteristics of studies involving the chest region											
Imperatori/2016/Italy (Imperatori et al., 2016)	92	KT	46	Mean 65	Placebo	46	Mean 66	1 day and 4 weeks	VAS	NA	Qualitative
D. Characteristics of studies involving the low back region											
Added/2016/Brazil (Added et al., 2016)	148	KT with physical therapy	74	45.6±11.6	Physical therapy	74	44.6±11.7	5 weeks	NPRS	RMDQ	Quantitative
Araujo/2016/Brazil (Araujo et al., 2018)	145	KT with skin convolutions	73	Between 18 and 80	KT without convolutions	72	Between 18 and 80	24 weeks	NPRS	RMDQ	Qualitative
Junior/2014/Brazil (Luz Junior et al., 2015)	60	KT	20	44.3±15.0	Micropore (placebo) group	20	50.1±17.5	2 days	NPRS	RMDQ	Quantitative
					Control group	20	48.1±13.4				
Bharti/2015/India (Bharti et al., 2015)	30	KT with conventional physiotherapy	15	Range 18 to 45	Conventional physiotherapy	15	Range 18 to 45	4 weeks	VAS	RMDQ	Quantitative
Forozeshfard/2016/Iran (Forozeshfard et al., 2016)	32	KT	16	20.6±2.5	No KT	16	21.7±2.1	Third day of menstrual cycle	VAS	ODI	Quantitative

Mazloum/2017/Iran (Mazloum, 2017)	40	KT	20	Mean 48.6	Sham taping	20	Mean 50.3	4 weeks	NPRS	RMDQ	Quantitative
Paoloni/2011/Italy (Paoloni et al., 2011)	39	KT with exercises	13	62.5±12.3	KT alone	13	62.5±12.3	1 day	VAS	RMDQ	Quantitative
					Exercise alone	13	62.5±12.3				
Al-Shareef/2016/KSA (Al-Shareef et al., 2016)	40	Erector spinae taping	20	37.55±9.82	Placebo	20	35.55±8.04	4 weeks	VAS	ODI	Quantitative
Kachanathu/2014/KSA (Kachanathu et al., 2014)	40	KT	20	34.8±7.54	Physiotherapy	20	34.8±7.54	Immediately post-interventional	NPRS	RMDQ	Quantitative
Ciosek/2015/Poland (Ciosek et al., 2015)	60	KT	30	Range 56 to 85	Control	30	Range 56 to 85	Immediately post-interventional	VAS	NA	Quantitative
Atici/2017/Turkey (Atici et al., 2017)	40	KT with tension and home exercises	20	Mean 16.1 (range 14 to 18)	KT only	20	Mean 16.1 (range 13 to 18)	4 weeks	VAS	NA	Qualitative
Balki/2016/Turkey (Balki et al., 2016)	30	KT	15	Mean 28.1 (range 18 to 39)	Sham taping	15	Mean 28.1 (range 18 to 39)	5 and 10 days	VAS-R	NA	Quantitative
Kelle/2015/Turkey (Kelle et al., 2016)	109	KT + Paracetamol	54	Mean 40.3	Control + Paracetamol	55	Mean 42.8	4 weeks	NPRS	ODI	Quantitative
Talu/2016/Turkey (Talu et al., 2016)	42	KT and stabilization exercises	21	43.38±11.25	Stabilization exercises	21	36.29±9.83	1 day	VAS	ODI	Quantitative
E. Characteristic of studies involving the knee region											
Wageck/2016/Brazil (Wageck et al., 2016)	76	KT	38	69.6±6.9	Sham taping	38	68.6±6.3	4 weeks	NA	WOMAC	Quantitative

Sedhom/2016/Egypt (Gaid Sedhom, 2016)	40	KT	20	48.7±5.82	Aescin, diethylamine Salicylate gel phonophoresis with pulsed ultrasound	20	49.52±5.82	4 weeks	VAS	NA	Quantitative
Donec/2014/Lithuania (Donec & Krisciunas, 2014)	89	KT	40	66.6±10.5	Control	49	68.1±7.8	4 weeks	NPRS	NA	Quantitative
Akbas/2011/Turkey (Akbas et al., 2011)	31	KT + Muscle strengthening and soft tissue stretching exercises	15	41±0.9	Muscle strengthening and soft tissue stretching exercises	16	44.88±0.72	6 weeks	VAS	NA	Quantitative
Aytar/2011/Turkey (Aytar et al., 2011)	22	KT	12	22.41±1.62	Placebo	10	26.20±3.52	45 min	VAS	NA	Quantitative
Kocyigit/2015/Turkey (Kocyigit et al., 2015)	41	KT	21	52±7.5	Sham taping	20	52±10	12 days	VAS activity, VAS nocturnal pain	NA	Qualitative
Mutlu/2016/Turkey (Kaya Mutlu et al., 2017)	39	KT	20	54.25±6.01	Placebo	19	57.1±6.26	4 weeks	VAS	WOMAC	Quantitative
F. Characteristics of studies involving the lower limb region except the knee											
Aguilar-Ferrandiz/2014/Spain (Aguilar-Ferrandiz, Moreno-Lorenzo, et al., 2014)	130	KT	65	64.4±13.1	Sham taping	65	66.48±12.7	4 weeks	VAS	NA	Quantitative

Aguilar-Ferrandiz/2014/Spain (Aguilar-Ferrandiz, Castro-Sanchez, et al., 2014)	104	KT	50	64.40±13.1	Placebo	54	66.48±12.7	4 weeks	VAS	NA	Quantitative
Aguilar-Ferrandiz/2013/Spain (Aguilar-Ferrandiz et al., 2013)	123	KT	62	66.05±13.7	Sham taping	61	63.32±14.3	4 weeks	VAS	NA	Quantitative

Abbreviations: KT = Kinesio taping; SD = standard deviation; CR = conventional rehabilitation; NDI = Neck Disability Index; NPS = Numerical Pain Scale; CTM = Cervical Thrust Manipulation; PIR = post-isometric muscle relaxation; NPRS = Numerical Pain Rating Scale; OA = osteoarthritis; ROM = Range of motion; VAS = visual analogue scale; VAS-W = visual analogue scale-worst pain; VAS-U = visual analogue scale-usual pain; VAS-R = visual analogue scale-resting pain; VAS-A = visual analogue scale-activity pain; VAS-N = visual analogue scale-night pain; NPDS = Neck Pain Disability Scale; RMDQ = Roland Morris Disability Questionnaire; TENS = Transcutaneous Electrical Nerve Stimulation; WOMAC = The Western Ontario and McMaster Universities Osteoarthritis Index; TMJ = Temporomandibular joint; PR = pressure release; ODI = Oswestry disability index; DASH = Disabilities of the Arm, Shoulder and Hand; RBA = resting bioelectrical activity; FPLS = Five-point Likert scale for functional limitation; QA = Quality assessment; NA: not available.

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765 Supplementary Table 1. PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	4
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is	5

		already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	6
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	7
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving	7

		rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	7
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	7
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	7
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for	8

		obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	8
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	8
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	8, 9
Synthesis of results	14	Describe the methods of handling data and combining results of	8, 9

		studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	
Section/topic	**#**	**Checklist item**	**Reported on page #**
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	9, Figure 2 + Supplementary Figure 1 + Supplementary Figure 2
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	8, 9
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow	9

		diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	9 + Table 1
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Supplementary Figure 1
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	9 to 11
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and	9 to 11

		measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	9, Figure 2
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	9 to 11
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	11 to 14
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified	14

		research, reporting bias).	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	14
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	15

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767 Supplementary Table 2. Summary of the results of both qualitative and quantitative data synthesis

Author/Year/Country	Sample Size	Effect Size	Target Outcome	The Condition managed	Comparison groups (Measurement tool)	Time point (Follow-up duration)
A. Neck and Upper limb region						
El-Abd/2016/Egypt (El-Abd et al., 2017)	46	SMD=-1.071 (95%CI: -1.679, -0.462)	Disability	Mechanical neck dysfunction	KT vs Correction Exercise (NDI)	4 weeks
Homayouni/2013/Iran (Homayouni, 2013)	60	SMD=-1.665 (95%CI: -2.247, -1.084)	Pain	De Quervain's Disease	KT vs Physiotherapy (VAS)	4 weeks
***Shakeri/2017/Iran (Shakeri et al., 2018)**	30	SMD=-0.537 (95%CI: -1.246, 0.172)	Disability	Lateral epicondylitis	KT + Tension vs KT (DASH)	1 week
		SMD=-1.184 (95%CI: -1.942, -0.426)	Pain		KT + Tension vs KT (VAS)	

Pelosin/2013/Italy (Pelosin et al., 2013)	12	SMD=-0.956 (95%CI: -1.808, -0.103)	Pain	Focal dystonia	KT vs Sham (VAS-U)	4 weeks
Lee/2015/Korea (Lee et al., 2015)	37	SMD=-0.162 (95%CI: -0.794, 0.469)	Pain	Delayed onset muscle soreness of biceps brachii	KT vs Control (VAS)	1 day
Halski/2015/Poland (Halski et al., 2015)	49	SMD=-1.033 (95%CI: -1.621, -0.445)	Pain	Latent upper trapezius trigger points	KT vs Placebo (VAS)	1 day
Ptaszkowski/2015/Poland (Ptaszkowski et al., 2015)	52	SMD=-0.794 (95%CI: -1.351, -0.237)	Pain	Normalization of the Upper Trapezius Muscle Tone and the Pain Relief	KT vs PiRT (VAS)	1 day
Gonzalez-Iglesias/2009/Spain (Gonzalez-Iglesias et al., 2009)	41	SMD=-1.034 (95%CI: -1.675, -0.394)	Pain	Acute Whiplash injury	KT vs Sham (NPRS)	1 day
***Saavedra-Hernandez/2012/Spain**	76	SMD=-0.099 (95%CI: -0.545, 0.346)	Disability	Mechanical neck pain	KT vs Manipulation (NDI)	1 week

(Saavedra-Hernandez et al., 2012)		SMD=-0.141 (95%CI: -0.587, 0.305)	Pain		KT vs Manipulation (NPRS)	
***Chang/2014/Taiwan (Chang et al., 2014)**	50	SMD=-0.040 (95%CI: -0.586, 0.506)	Pain	Acute neck pain	KT + Pain Relief vs KT + Placebo (VAS)	Immediately post-interventional
		SMD=-0.059 (95%CI: -0.605, 0.487)				1 day
***Ay/2015/Turkey (Ay et al., 2017)**	61	SMD=-0.611 (95%CI: -1.119, -0.104)	Disability	Cervical myofascial pain syndrome	KT vs Sham (NDI)	2 weeks
		SMD=-1.009 (95%CI: -1.536, -0.482)	Pain		KT vs Sham (VAS)	
Copurgensli/2016/Turkey (Copurgensli et al., 2016)	30	SMD=-0.020 (95%CI: -0.716, 0.676)	Disability	Cervical spondylosis	KT + Conventional Rehabilitation vs Mobilization + Conventional	4 weeks

					Rehabilitation (NDI)	
		SMD=-0.069 (95%CI: -0.766, 0.626)	Pain		KT vs Conventional Rehabilitation (VAS-R)	
Hayta/2016/Turkey (Hayta & Umdu, 2016)	55	SMD=-0.352 (95%CI: -0.877, 0.173)	Disability	Myofascial pain syndrome	KT vs Dry Needle (NDI)	4 weeks
		SMD=-0.164 (95%CI: -0.686, 0.357)	Pain		KT vs Dry Needle (VAS)	
Kavlak/2012/Turkey (Kavlak et al., 2012)	40	SMD=-0.192 (95%CI: -0.801, 0.416)	Disability	Unspecified neck pain	KT vs Classic treatment (NDI)	1 day
		SMD=-0.656 (95%CI: -1.280, -0.031)	Pain		KT vs Classic treatment (VAS-R)	

Kilinc/2015/Turkey (Kilinç et al., 2016)	28	SMD=-0.105 (95%CI: -0.824, 0.614)	Pain	Chronic mechanical neck pain	KT vs Mobilization (VAS)	4 days
Pekyavas/2014/Turkey (Pekyavas et al., 2014)	28	SMD=-1.454 (95%CI: -2.268, -0.640)	Pain	Postmastectomy lymphedema	KT vs Bandage (VAS)	4 weeks
B. Face and TMJ region						
Ristow/2013/Germany (Ristow et al., 2013)	26	SMD=-0.023 (95%CI: -0.768, 0.721)	Pain	Postoperative swelling, pain, and trismus after ORIF of mandibular fractures	KT vs Control (VAS)	1 day
***Bae/2014/Korea (Bae, 2014)**	42	SMD=-1.617 (95%CI: -2.307, -0.928)	Pain	Myofascial pain	KT vs Control (VAS)	2 weeks
Azatcam/2016/Turkey (Azatcam et al., 2017)	46	SMD=-0.167 (95%CI: -0.736, 0.404)	Disability	Myofascial pain syndrome	KT + Exercise vs Exercise (NDI)	1 day

		SMD=-0.014 (95%CI: -0.582, 0.553)	Pain		KT + Exercise vs Exercise (VAS)	1 day
***Benlidayi/2016/Turkey (Coskun Benlidayi et al., 2016)**	28	SMD=-1.147 (95%CI: -1.926, -0.367)	Disability	Temporomandibular disorders	KT + Exercise vs Exercise (RDC/TMD II)	6 weeks
		SMD=-0.106 (95%CI: -0.826, 0.613)	Pain		KT + Exercise vs Exercise (VAS)	1 week
		SMD=-0.356 (95%CI: -1.081, 0.368)				6 weeks
Capo-Juan/2016/Spain (Capó-Juan et al., 2017)	50	SMD=-0.696 (95%CI: -1.258, -0.133)	Pain	Cervical Myofascial pain	KT vs placebo (NRS)	1 day
C. Chest region						

***Imperatori/2016/Italy (Imperatori et al., 2016)**	92	SMD=-0.488 (95%CI: -0.900, -0.077)	Pain	Chest pain after lobectomy for lung cancer	KT vs Placebo (VAS)	1day
		SMD=-2.032 (95%CI: -2.532, -1.531)				4 weeks
D. Low Back region						
Added/2016/Brazil (Added et al., 2016)	148	SMD=-0.151 (95%CI: -0.471, 0.171)	Disability	Chronic low back pain	KT + Exercise vs Exercise (RMDQ)	5 weeks
		SMD=-0.026 (95%CI: -0.350, 0.297)	Pain		KT + Exercise vs Exercise (VAS)	
***Araujo/2016/Brazil (Araujo et al., 2018)**	145	SMD=-0.169 (95%CI: -0.493, 0.155)	Disability	Chronic non-specific low back pain	KT + Skin convolution vs KT (RMDQ)	24 weeks
		SMD=-0.283 (95%CI: -0.608, 0.042)	Pain		KT + Skin convolution vs KT (VAS)	

Junior/2014/Brazil (Luz Junior et al., 2015)	60	SMD=-0.221 (95%CI: -0.854, 0.411)	Disability	Chronic non-specific low back pain	KT vs Micropore (Placebo) (RMDQ)	2 days
		SMD=-0.464 (95%CI: -1.096, 0.167)			KT vs Control (RMDQ)	
		SMD=-0.036 (95%CI: -0.667, 0.593)	Pain		KT vs Micropore (Placebo) (NPRS)	
		SMD=-0.376 (95%CI: -1.005, 0.252)			KT vs Control (NPRS)	
Bharti/2015/India (Bharti et al., 2015)	30	SMD=-1.285 (95%CI: -2.054, -0.517)	Disability	Non-specific low back pain	KT + Physiotherapy vs Physiotherapy (RMDQ)	4 weeks
		SMD=-0.472 (95%CI: -1.178, 0.234)	Pain		KT + Physiotherapy vs Physiotherapy (VAS)	

Forozeshfard/2016/Iran (Forozeshfard et al., 2016)	32	SMD=-0.223 (95%CI: -0.901, 0.454)	Disability	Menstrual low back pain	KT vs No KT (ODI)	Third day of menstrual cycle
		SMD=-0.181 (95%CI: -0.858, 0.495)	Pain		KT vs No KT (VAS)	
Mazloum/2017/Iran (Mazloum, 2017)	40	SMD=-0.015 (95%CI: -0.622, 0.592)	Disability	Chronic non-specific low back pain	KT vs Sham (RMDQ)	4 weeks
		SMD=-0.359 (95%CI: -0.971, 0.253)	Pain		KT vs Sham (VAS)	
Paoloni/2011/Italy (Paoloni et al., 2011)	26	SMD=-0.646 (95%CI: -1.411, 0.118)	Disability	Chronic low back pain	KT vs Exercise (RMDQ)	1 day
		SMD=-0.037 (95%CI: -0.781, 0.707)	Pain		KT vs Exercise (VAS)	

Al-Shareef/2016/KSA (Al-Shareef et al., 2016)	40	SMD=-1.036 (95%CI: -1.685, -0.388)	Disability	Chronic non-specific low back pain	KT vs Placebo (ODI)	4 weeks
		SMD=-2.196 (95%CI: -2.971, -1.421)	Pain		KT vs Placebo (VAS)	
Kachanathu/2014/KSA (Kachanathu et al., 2014)	40	SMD=-0.335 (95%CI: -0.947, 0.276)	Disability	Non-specific low back pain	KT+Physiotherapy vs Physiotherapy (RMDQ)	1 day
		SMD=-0.515 (95%CI: -1.133, 0.102)	Pain		KT + Physiotherapy vs Physiotherapy (VAS)	
Ciosek/2015/Poland (Ciosek et al., 2015)	60	SMD=-0.978 (95%CI: -1.507, -0.448)	Pain	Lumbar spine pain	KT vs Control (VAS)	Immediately post-interventional
***Atici/2017/Turkey (Atici et al., 2017)**	40	SMD=-1.093 (95%CI: -1.746, -0.440)	Pain	Lenke Type 1 adolescent idiopathic scoliosis	KT + Tension + Home Exercise vs KT (VAS)	4 weeks

Balki/2016/Turkey (Balki et al., 2016)	30	SMD=-0.560 (95%CI: -1.270, 0.150)	Pain	Acute phase of ACL reconstruction	KT vs Control (VAS-R)	5 days
		SMD=-0.507 (95%CI: -1.215, 0.200)				10 days
Kelle/2015/Turkey (Kelle et al., 2016)	109	SMD=-0.457 (95%CI: -0.835, -0.08)	Disability	Acute non-specific low back pain	KT + Paracetamol vs Control + Paracetamol (ODI)	1 day
		SMD=-0.351 (95%CI: -0.726, 0.025)				4 weeks
		SMD=-0.872 (95%CI: -1.262, -0.482)	Pain		KT + Paracetamol vs Control + Paracetamol (NRS)	1 day
		SMD=-0.583 (95%CI: -0.963, -0.202)				4 weeks

Talu/2016/Turkey (Talu et al., 2016)	42	SMD=-2.232 (95%CI: -2.994, -1.471)	Disability	Lumbar region pathologies without neurological deficits	KT + Stabilization vs Stabilization (ODI)	1 day
		SMD=-0.401 (95%CI: -1.001, 0.198)	Pain		KT + Stabilization vs Stabilization (VAS-R)	
E. Knee region						
Wageck/2016/Brazil (Wageck et al., 2016)	76	SMD=-0.118 (95%CI: -0.734, 0.497)	Disability	Knee osteoarthritis	KT vs Sham (WOMAC)	4 weeks
		SMD=-0.219 (95%CI: -0.677, 0.238)	Pain		KT vs Sham (Lysholm)	
Sedhom/2016/Egypt (Gaid Sedhom, 2016)	40	SMD=-1.797 (95%CI: -2.521, -1.073)	Pain	Knee osteoarthritis	KT vs Aescin, Diethylamine salicylate gel phonophoresis (VAS)	4 weeks

Donec/2014/Lithuania (Donec & Krisciunas, 2014)	89	SMD= 0.000 (95%CI: -0.414, -0.414)	Pain	Postoperative rehabilitation after total knee replacement	KT vs Control (NPRS)	4 weeks
Akbas/2011/Turkey (Akbas et al., 2011)	31	SMD=-0.257 (95%CI: -0.946, 0.431)	Pain	Patellofemoral pain syndrome	KT + Muscle strengthening and soft tissue stretching exercises vs Muscle strengthening and soft tissue stretching exercises (VAS-R)	3 weeks
		SMD=-0.357 (95%CI: -1.048, 0.334)				6 weeks
Aytar/2011/Turkey (Aytar et al., 2011)	22	SMD=-0.145 (95%CI: -0.953, 0.663)	Pain	Patellofemoral pain syndrome	KT vs Placebo (VAS-Wa)	45 min
***Kocyigit/2015/Turkey (Kocyigit et al., 2015)**	41	SMD=-0.117 (95%CI: -0.718, 0.483)	Pain	Knee osteoarthritis	KT vs Sham (VAS-A)	12 days

Mutlu/2016/Turkey (Kaya Mutlu et al., 2017)	39	SMD=-0.444 (95%CI: -1.067, 0.178)	Disability	Knee osteoarthritis	KT vs Placebo (WOMAC)	4 weeks
		SMD=-0.923 (95%CI: -1.572, -0.275)	Pain		KT vs Placebo (VAS-R)	
F. Lower limb region except the Knee						
Aguilar-Ferrandiz/2014/Spain (Aguilar-Ferrandiz, Moreno-Lorenzo, et al., 2014)	130	SMD=-1.299 (95%CI: -1.675, -0.922)	Pain	Chronic venous insufficiency	KT vs Sham (VAS)	4 weeks
Aguilar-Ferrandiz/2014/Spain (Aguilar-Ferrandiz, Castro-Sanchez, et al., 2014)	104	SMD=-1.526 (95%CI: -1.961, -1.092)	Pain	Chronic venous insufficiency	KT vs Placebo (VAS)	4 weeks
Aguilar-Ferrandiz/2013/Spain	123	SMD=-1.110 (95%CI: -1.488, -0.732)	Pain	Chronic venous insufficiency	KT vs Sham (VAS)	4 weeks

(Aguilar-Ferrandiz et al., 2013)						

The asterisk indicates the studies included in the qualitative synthesis only.

Abbreviations: KT = Kinesio taping; SD = standard deviation; CR = conventional rehabilitation; NDI = Neck Disability Index; NPS = Numerical Pain Scale; CTM = Cervical Thrust Manipulation; PIR = post-isometric muscle relaxation; NPRS = Numerical Pain Rating Scale; OA = osteoarthritis; ROM = Range of motion; VAS = visual analogue scale; VAS-W = visual analogue scale-worst pain; VAS-U = visual analogue scale-usual pain; VAS-R = visual analogue scale-resting pain; VAS-A = visual analogue scale-activity pain; VAS-N = visual analogue scale-night pain; NPDS = Neck Pain Disability Scale; RMDQ = Roland Morris Disability Questionnaire; TENS = Transcutaneous Electrical Nerve Stimulation; WOMAC = The Western Ontario and McMaster Universities Osteoarthritis Index; TMJ = Temporomandibular joint; PR = pressure release; ODI = Oswestry disability index; DASH = Disabilities of the Arm, Shoulder and Hand; RBA = resting bioelectrical activity; FPLS = Five-point Likert scale for functional limitation; QA = Quality assessment; NA: not available.

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