

A hand is shown applying a piece of colorful kinesio tape (in shades of blue, pink, and orange) to a human arm. The tape is being stretched and applied to the skin. The background is white.

WHAT IS THE CURRENT EVIDENCE FOR THE USE OF KINESIO TAPE? A LITERATURE REVIEW

The popularity of kinesio taping has skyrocketed in recent weeks due to a high-profile presence at the London 2012 Olympics and European Football Championships, with widespread coverage in mainstream media. Much attention has been paid to the athletes wearing the tape and the claims made by the manufacturers, with very little evidence being given as to its efficacy. It is the aim of this article to assess if the current body of evidence supports the use of kinesio taping in the treatment of musculoskeletal conditions.

BACKGROUND

Kinesio taping was developed by Japanese chiropractor Kenso Kase in the 1970s as a method of assisting physical treatment of damaged tissue while maintaining full range of motion – unlike traditional taping methods, which restrict movement. The Kinesio Taping Association (KTA) has over 10,000 members worldwide and is training professionals at a rate of over 800 per year in the UK.

Kinesio tape (KT) first gained widespread attention at the 1988 Seoul Olympics, where 50,000 rolls were donated to 58 countries, giving the product exposure on the world stage. Since then, high-profile athletes such as Lance Armstrong, Rory McIlroy and David Beckham have popularised use of the tape, and it can now be regularly seen at many high-profile sporting events.

The precise mechanism of how the tape works is ultimately unproven

but its ability to stretch longitudinally when placed on the skin is the primary mechanism offered by its inventor (1). The tape is said to lift the epidermis as it recoils after being applied with tension. This 'lifting' increases space between the skin and the underlying connective tissues, vessels and muscles to improve mobility and aid lymphatic and venous movement. The 'lifting' also has an effect on underlying fascia, reducing pain, decreasing susceptibility to microtrauma and improving muscle performance.

The therapeutic effect is the same for all available colours and some believe is dependent on the direction that the tape is applied. Figure 1a demonstrates a typical application to inhibit a muscle, tension is applied distally to proximally, whereas Figure 1b shows application in the opposite direction to facilitate a weakened muscle; both applied with minimal



Figure 1a: Muscle inhibition (biceps brachii).

tension in the tape.

Application of KT to aid oedema reduction is shown in Figure 2a. A single strip is cut into multiple tails placed over the oedema with 0–20% tension. The 'head' of the tape is placed towards the target lymph nodes.

KT can also be used to increase joint stability by placing it over the unstable joint with all the stretch removed (Figure 2b), making the tape behave more akin to traditional athletic strapping.

EFFECTS ON HEALTHY INDIVIDUALS

The effect of kinesiology taping on



Figure 2a: Lymphatic correction.



Figure 1b: Muscle facilitation (biceps brachii).

healthy individuals has been the subject of a number of observational studies, which have focused on a range of outcomes including muscle strength and motor nerve conduction.

Where numerous trials have looked at the same outcome, results are contradictory. In the case of grip strength, one study (2) found no positive effect from KT applied to the forearm, compared to sham and no taping, though another (3) found a clear improvement in grip strength, albeit without a control group.

Similar contradictions are found in studies looking at effects on the quadriceps. Positive effects have been



Figure 2b: Mechanical support (acromioclavicular joint).

KINESIO TAPING ASSISTS TREATMENT OF DAMAGED TISSUE WHILST MAINTAINING FULL RANGE OF MOTION

seen on jump height (4) and motor unit recruitment (5), whereas another study (6) found the overall effects of KT mixed, with eccentric force improved but concentric force the same as control, and another (7) found no positive effect at all.

Overall, studies involving healthy individuals found some positive effect on muscle strength, flexibility and motor nerve conduction suggesting that KT has some therapeutic value.

RESULTS

Patellofemoral Pain Syndrome

Table 1 summarises the results for the use of KT in patellofemoral pain (PFPS). All three papers hypothesised that pain is caused by maltracking of the patella, following imbalance between vastus medialis and vastus lateralis, and patients were taped accordingly.

Akbas et al. (8) found that KT in conjunction with strengthening exercises and soft tissue massage achieved faster improvements (significant at three weeks) in both pain and muscle flexibility when compared to exercise and massage alone, although final outcome levels at six weeks were similar in both groups.

The two remaining studies looked at the effects of KT immediately after application. Aytar et al. (9) examined the effect on pain alongside balance, proprioception and muscle strength when compared to sham tape. Although there were no statistically significant differences in pain and proprioception after application, positive effects were seen on muscle strength and dynamic balance in the KT group.

Finally, Chen et al. (10) investigated the effects on stair climbing and found ground force reaction reduced when descending and muscle firing improved in the symptomatic KT group. No positive results were seen in the asymptomatic group despite identical

METHODS

To identify relevant studies PUBMED, AMED, CINAHL, PEDRO and SPORTDiscus databases were searched up to 9 August 2012, along with the following websites: the Osteopathic Research Web (www.osteopathic-research.com), OSTMED (www.ostmed-dr.com), Journal of American Osteopathic Association (www.jaoa.org/), Chiropractic & Manual Therapies (www.chiromt.com) and Open Grey (www.opengrey.eu).

To focus the results, all studies where kinesio tape was not the primary focus were removed, as were treatments for non-musculoskeletal conditions such as cerebral palsy and breast cancer. Observational studies on healthy individuals were also discarded. Only controlled trials were selected for review.

Searching the selected papers by hand identified ten additional papers, one of which met all the relevant inclusion and exclusion criteria (Figure 3). Therefore, ten studies were identified with a total of 386 participants, investigating the effect of kinesio tape on patellofemoral pain (n=3), shoulder impingement (n=3), whiplash associated disorder (n=1), chronic lower back pain (n=2) and plantar fasciitis (n=1).

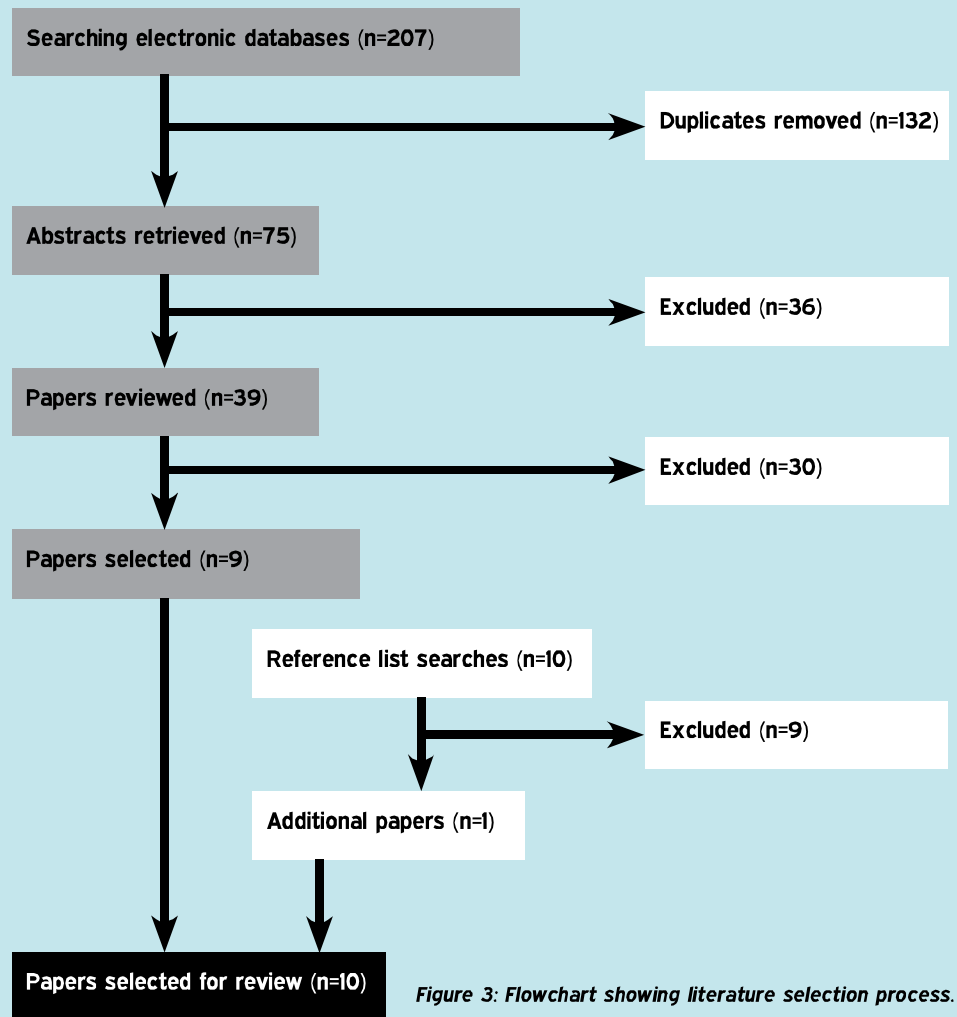


Figure 3: Flowchart showing literature selection process.

TABLE 1: SUMMARY OF RESULTS FROM SELECTED PAPERS INVESTIGATING PATELLOFEMORAL PAIN SYNDROME (PFPS)

Study	Participants	Outcomes measured	Experimental group	Control group	Summary of results
Akbas et al., 2011 (8)	n=31	1. Pain 2. Soft tissue flexibility 3. Patellar positioning	1. KT to facilitate quadriceps, ilio-tibial band (ITB) and hamstrings 2. Strengthening exercises 3. Soft tissue massage (n=16)	1. Strengthening exercises 2. Soft tissue massage (n=15)	<ul style="list-style-type: none"> ■ Pain, flexibility improved in both groups by end of trial ■ Flexibility of soft tissues (hamstrings and ITB) occurred faster and greater in KT group ■ Neither group saw positive change in patellar position
Aytar et al., 2011 (9)	n=22	1. Pain 2. Muscle strength 3. Proprioception 4. Balance	KT to quadriceps and around patella (n=12)	Identical taping but with non-flexible sticking plaster (n=10)	<ul style="list-style-type: none"> ■ Strength improved in both groups (60° = both, 180° = KT only) ■ Balance improved in both groups (static = both, dynamic = KT only) ■ No significant changes in pain or proprioception in either group
Chen et al., 2008 (10)	n=25	1. Ground force reaction (GRF) 2. Muscle firing	KT to facilitate vastus medialis and inhibit vastus lateralis – PFPS sufferers (n=15)	Identical taping in healthy individuals (n=10)	<ul style="list-style-type: none"> ■ No positive effect seen in healthy individuals ■ GRF reduced in descending stairs in KT group ■ Timing of activation of vastus medialis improved in KT group

application of KT.

Positive results in pain, soft tissue flexibility, muscle activation and strength echo findings from trials featuring healthy individuals (4–6), suggesting that KT may offer some relief from the symptoms of PFFS, particularly in the short term.

Shoulder Impingement

Table 2 summarises the results for the use of KT in shoulder impingement (SI).

The first study (11) adopted a pre-test and post-test model, comparing KT to sham tape applied across the lower trapezius of a small group (n=17) of symptomatic baseball players. Scapular movement improved in both groups, as did activation of the upper trapezius and serratus anterior but the KT group also showed improvements in activity and strength of the lower fibres of trapezius. The unorthodox taping protocol used in this study alongside the rather narrow population studied, who have specific loads on their shoulder complex, make this study perhaps less relevant when looking at a broader application of KT for shoulder pain.

The two remaining studies (12,13) investigated the effects of KT on pain and disability, with a similar taping protocol across supraspinatus, deltoid

“ A REDUCTION IN THE THICKNESS OF PLANTAR FASCIA OF OVER 16% IS A CLEAR POSITIVE OUTCOME OF KINESIO TAPING ”



and teres minor muscles.

The first (12) compared KT (applied every three days, along with guided home exercises) to a daily programme of ultrasound, TENS, heat pack and home exercise. Pain levels at the end of the two-week trial were similar in both groups but the KT group improved faster with significant differences at

the end of week one. Disability scores were more improved in the KT group at the end of the trial (a drop from 57.5 to 18 compared with a drop from 56 to 31 on the DASH 100-point score).

The final study (13) compared KT to sham tape over a six-day period. By the end of the trial, both groups achieved similar results for improvement

TABLE 2: SUMMARY OF RESULTS FROM SELECTED PAPERS INVESTIGATING SHOULDER IMPINGEMENT (SI).

Study	Participants	Outcomes measured	Experimental group	Control group	Summary of results
Hsu et al., 2009 (11)	n=17*	1. Shoulder kinematics 2. Muscle activity 3. Muscle strength	KT to lower trapezius (n=17)	Identical taping but with non-flexible 3M tape (n=17)	<ul style="list-style-type: none"> ■ Improved scapular posterior tilt at 30–60° in both groups ■ Increased lower trapezius activity at 60–30° in KT group ■ Decreased activity in same range in control group ■ Increase in serratus anterior and upper trapezius activity in both ■ Increase in strength of lower trapezius in KT group
Kaya et al., 2010 (12)	n=55	1. Pain 2. Disability	KT over supraspinatus, deltoid and teres minor + home exercise program (n=30)	Ultrasound, TENS, heat pack and exercise daily + home exercise program (n=25)	<ul style="list-style-type: none"> ■ Pain improved equally by end of trial but improvement was initially faster in KT group ■ Disability scores lower in KT group than control group at end of trial
Thelen et al., 2008 (13)	n=42	1. Pain 2. Disability 3. Range of movement (ROM)	KT over supraspinatus and deltoid and across coracoid process (n=21)	KT applied with no tension in non-therapeutic areas (n=21)	<ul style="list-style-type: none"> ■ Immediate improvement in ROM in KT group but similar improvement in both groups at end of trial ■ No significant improvements to pain or disability in either group

*All subjects received both the kinesio taping and the placebo taping (3M Micropore tape) over the lower trapezius muscle.

POSITIVE EFFECTS OF KT ARE SEEN ON SOFT TISSUE FLEXIBILITY, FASCIA THICKNESS, PAIN AND DISABILITY

of pain-free range of movement but the KT group achieved results after just three days compared to six days for the control group. There was no significant difference in pain or disability in either group by the end of the trial.

Both papers demonstrate that although final outcomes in experimental and control groups are ultimately similar, the KT groups improved faster with less intervention. This suggests that KT could offer a low cost alternative to conventional treatment for shoulder impingement.

Chronic Low Back Pain

Paolini et al. (14) addressed chronic lower back pain (CLBP) (Table 3), focusing on “flexion-relaxation” (FR) of the lumbar erector spinae. In healthy individuals, muscle activity is reduced

after forward flexion whereas in CLBP sufferers it is hypothesised that these same muscles are held in a state of contraction.

The effects were studied across three treatment groups; KT only, KT plus home exercises and home exercises only. An immediate effect was seen on pain in all KT groups but it was the home exercise group that showed most improvement in disability at the end of the 4-week trial.

Castro-Sanchez et al. (15) also looked at CLBP (Table 3), comparing the effect of a ‘star’ application of KT against a single horizontal KT strip on pain, disability, kinesiophobia, trunk range of motion and muscle endurance when performing a side plank. No effect was seen on kinesiophobia although range of motion and disability slightly improved in the experimental group. This group demonstrated mild improvement in pain after one week, which was maintained four weeks later but the biggest improvement was seen in muscle endurance when performing the plank. However it is unclear as to whether the improvement was due to improvement

of pain or muscle strength.

A study of healthy individuals (16) found positive results in increased forward flexion immediately after using KT to facilitate lumbar erector spinae. Although no assessment was made of pain and a direct connection between increased range of movement and reduced pain is not possible from these results alone, when combined with the results in the two previous studies (14, 15) there is an indication of how KT could be used in CLBP.

Whiplash Associated Disorder (WAD)

Gonzalez-Iglesias et al. (17) investigated the effect of KT on pain and cervical range of motion following WAD over a 24-hour period when compared to sham KT (applied with no tension). Although there were statistically significant improvements to both pain and range of motion in the KT group at the end of the trial, both were at levels deemed not clinically relevant (Table 3).

Plantar Fasciitis (PF)

The last paper (18) focused on plantar

TABLE 3: SUMMARY OF RESULTS FROM SELECTED PAPERS INVESTIGATING CHRONIC LOW BACK PAIN (CLBP), WHIPLASH ASSOCIATED DISORDER (WAD) AND PLANTAR FASCIITIS (PF)

Study	Participants	Outcomes measured	Experimental group	Control group	Summary of results
Paoloni et al., 2011 (14) (CLBP)	n=39	1. Pain 2. Disability 3. Muscle function (FR ability)	KT along lumbar erector spinae and midline (3 strips total) (n=13) <i>Note: All participants taped initially for immediate results on pain and FR (n=39)</i>	KT applied in same way + home exercises (n=13) Home exercises only (n=13)	<ul style="list-style-type: none"> ■ Immediate reduction in pain in all KT groups ■ Improved FR in 17/39 initially ■ Pain improved in all groups at end of trial ■ Disability improved most in non-KT group ■ FR most improved at end of trial in KT + Exercise group
Castro-Sanchez et al., 2012 (15) (CLBP)	n=60	1. Pain 2. Disability 3. Kinesiophobia 4. Trunk ROM 5. Muscle endurance	KT applied in a star pattern over area of greatest discomfort (n=30)	KT applied in single horizontal strip over area of greatest discomfort (n=30)	<ul style="list-style-type: none"> ■ Marginally-relevant improvement in disability initially ■ Mild pain improvement after 1 wk and maintained after 5 wks ■ Kinesiophobia = no effect ■ Initial improvement on ROM ■ Significant improvement in muscle endurance
Gonzalez-Iglesias et al., 2009 (17) (WAD)	n=41	1. Pain 2. Cervical spine ROM	KT along posterior neck and across lower cervical spine (n=21)	KT applied with no tension in similar position (n=20)	<ul style="list-style-type: none"> ■ Improvements to cervical ROM and pain in KT group were statistically but not clinically relevant
Tsai et al., 2010 (18) (PF)	n=52	1. Pain 2. Foot function 3. Thickness of plantar fascia in 2 positions	KT over gastrocnemius and plantar fascia + daily physical therapy (ultrasound, TENS) (n=26)	Daily physical therapy only (n=26)	<ul style="list-style-type: none"> ■ Immediate improvement in pain and foot ■ Reduction in plantar fascia thickness in KT group in 1 of 2 designated sites only

fasciitis, comparing KT with daily physical therapy. Both pain and foot function improved more in the KT group and there was a significant reduction in plantar fascia thickness, as measured by ultrasound, at the insertion site on the calcaneus in the KT group. However, plantar fascia thickness at the site of most significant inflammation was unchanged in both groups.

It is this effect on fascial thickness that is perhaps one of the most significant findings from all the trials. Featuring one of the larger overall study groups (n=52), a mean reduction in the thickness of plantar fascia of over 16%

at the site of calcaneal attachment was one of the clearest positive outcomes. If this effect could be replicated in other areas of the body where a reduction in fascial mobility is concurrent with acute or chronic injury, the use of KT could be extremely effective as a stand-alone treatment or as part of an overall therapeutic approach (Table 3).

CONCLUSION

This study identified ten randomised controlled trials assessing the efficacy of kinesio tape (KT) in the treatment of musculoskeletal pathology.

Studies investigating effects of



FURTHER REOURCES



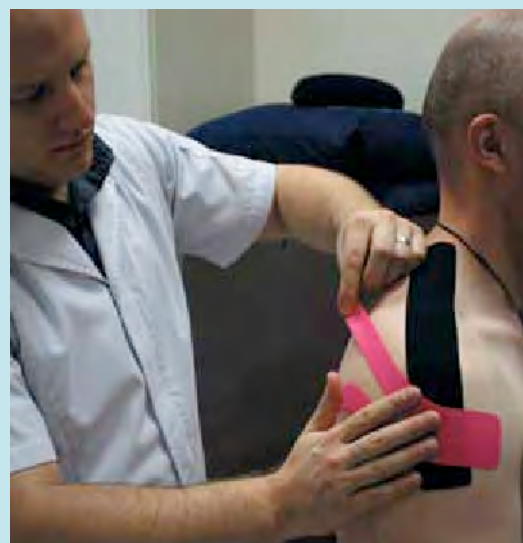
Taping patterns for lymphatic correction of the calf.



Taping the lumbar erector spinae.



Taping shoulder impingement.



KT on lower back pain, shoulder impingement and patellofemoral pain, found some positive results but heterogeneity of methodology makes it difficult to categorically confirm efficacy. By its very nature, the tape can be applied in many different ways to encourage a range of outcomes. This versatility makes analysis of the studies difficult, as often the application was quite different between trials despite the focus of the research being similar.

Although far from conclusive, each of these studies shows some positive effects of KT on soft tissue flexibility, fascia thickness, pain and/or disability. In particular KT appears to offer similar results to traditional treatments such as soft tissue massage, ultrasound, TENS or home exercise but achieves results faster and with fewer applications, although ultimately final outcomes are often the same.

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