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A Scoping Review of the Use of Elastic Therapeutic Tape for Neck or Upper Extremity Conditions

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Title: A Scoping Review of the Use of Elastic Therapeutic Tape for Neck or Upper Extremity Conditions

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Number of Figures: 1
Abstract

Study Design: Scoping review.
Introduction: Elastic therapeutic tape is a relatively new intervention for treating a variety of injuries; however, there is little evidence to support its effectiveness for neck or upper extremity conditions.
Purpose of the Study: This scoping review examines current evidence on the recommended application, purpose and effectiveness of elastic therapeutic tape for treating neck and upper extremity conditions.
Methods: A scoping review was conducted to examine the evidence in 14 peer-reviewed published articles that reported on the use of elastic therapeutic tape for neck or upper extremity conditions. Results: Six studies reported statistically significant changes to pain with the use of elastic therapeutic tape. Only three studies found statistically significant changes to range of motion.
Conclusions: Elastic therapeutic tape may play a role in reducing short-term neck and upper extremity pain, however future high quality studies that contribute to the evidence base for its use are needed.
Level of Evidence: N/A

Background

Kinesiotape, a form of elastic therapeutic tape, was developed by Dr. Kenso Kase (a chiropractor) in the 1970’s and is a relatively new elastic therapeutic tape used for treating a variety of injuries.\(^1,2\) Since that time, different names and brands of elastic therapeutic tape have emerged, such as Kinesiotex Tape, K-Tape, Kinaesthetic Tape, K-Tex Tape, Dynamic Tape, Rocktape and Spidertech Tape.\(^3\) Kinesiotape gained increased recognition after it was donated to 58 countries for use during the 2008 Olympic Games and was used by many high profile athletes. The theory behind elastic therapeutic tape is that it supports injured muscles and joints and helps to relieve pain by lifting the skin and allowing improved blood and lymph flow.\(^4\) It is reported that the tape can be applied to any muscle or joint in the body. Elastic therapeutic tape is made of tightly woven elasticised cotton fibres and the glue on the back is acrylic, highly durable and waterproof so the tape can be worn for up to a week, during which time it will withstand vigorous movement, sweat and total immersion in water.\(^1,3\) Equally important is the fact that the tape does not contain any medication or drugs – all the reported benefits come from the tape’s elasticity.\(^4,5\)

Despite its popularity and widespread clinical use, there is relatively little evidence to support the effectiveness of elastic therapeutic tape/Kinesiotape, let alone for specific neck and upper extremity conditions. From medical, social and economic perspectives, prevalence studies highlight that the burden of disease from neck and upper extremity conditions is substantial and there is a continual need to identify the most effective and economically feasible interventions for their optimal management and rehabilitation.\(^6\) To date, evidence regarding the effectiveness of elastic therapeutic tape/Kinesiotape has relied predominantly on case reports, small pilot studies and research on healthy participant groups.\(^7,8\) Three high quality systematic reviews have been completed since 2010 by Bassett, Lingman and Ellis,\(^7\) Kalro and Bar-Sela\(^8\) and Morris et. al.\(^9\) Three studies included in these reviews relate to taping for shoulder impingement syndrome and neck pain, however no other studies on upper extremity conditions met their respective inclusion criteria.

With regard to using elastic therapeutic tape for upper extremity conditions in particular, there appears to be some anecdotal evidence that merits using elastic therapeutic tape as an addition to existing treatment modalities, but broader, systematic examination of the available literature on this topic is needed in order to clarify the clinical benefits for neck and upper extremity conditions. At present, upper limb therapists who incorporate elastic taping in their clinical practice are required to construct a treatment plan using the manufacturer’s information, their own experience, and previous clinical observations. This exposes them to the risks associated with prescribing a treatment modality that has uncertain clinical efficacy, cost-effectiveness, and/or safety.

Purpose and Research Questions

The purpose of this scoping review is to examine the recommended application, purpose and effectiveness of elastic therapeutic tape/Kinesiotape, a relatively new but widely used treatment...
modality, in managing neck and upper extremity conditions. The specific aims of the scoping review are to (1) facilitate the understanding of the use and implementation of elastic therapeutic tape for neck and upper extremity conditions in clinical practice; and (2) review the current evidence of its effectiveness for the treatment of neck and upper extremity conditions.

Identification of the research question

The specific scoping review question is: “What is known from the existing literature about the recommended application, purpose and effectiveness (including types of outcome measures) of elastic therapeutic tape in the treatment of neck and/or upper extremity disorders?”

Methods

A scoping review method was used based on the framework outlined by Arskey and O’Malley. Scoping reviews are a useful way to facilitate a systematic approach to survey a specific body of literature as it enables researchers to ‘map a field of study’ in a particular area of interest. A scoping review is relevant in situations in which reviewers are interested in fields of research that have only emerging levels of evidence. Due to the lack of randomised controlled trials for the effectiveness of elastic therapeutic tape, especially related to neck and upper limb disorders, a scoping review was deemed the most suitable approach as it is able to include a broader range of studies and articles, including both empirical and non-empirical sources of information. It is important to note that, unlike systematic reviews, a scoping review does not consider the quality of studies as a first criterion, rather the objective is to understand the extent and level of empirical work that has been completed within a defined subject area. A scoping review of the topic can then form the basis from which researchers can begin to delve deeper into specific methodological issues and develop informed research questions.

This scoping review followed the five stage framework developed by Arskey and O’Malley: (1) identification of the research question; (2) identification of relevant studies; (3) selecting the studies; (4) charting the data; and (5) collating, summarising and reporting the results. Reporting results includes the use of numerical summaries that describe study characteristics (e.g. study location, year of publication, methods).

Identification and selection of studies

A search was conducted for English, peer-reviewed documents in the following electronic bibliographic databases: OVID Medline, CINAHL and ProQUEST. There was also a search for grey literature in ProQUEST Dissertations and Theses. Keywords used included ‘elastic therapeutic tape’, ‘therapeutic tape’, ‘elastic tape’, ‘taping’ and ‘kinesiotape’. As this scoping review aimed to include all studies, no limitations were placed in terms of publication date and publication type. The search was conducted by the three authors between July and September 2013 and initially yielded 866 studies. These studies were subsequently narrowed down to studies relating to the neck or upper limb and then further narrowed down to relevant studies for this scoping review.

Inclusion criteria

The retrieved studies were then screened to identify documents for the review based on the following inclusion criteria:

- The document reported on a primary study that examined elastic therapeutic tape as a treatment modality for people with neck and/or upper extremity conditions.
- The document provided a description of how the elastic therapeutic tape was used for a particular condition and/or population.
- The study was written in English.
- Participants in the studies were adults over 18 years of age.
All study designs were included (e.g. randomised controlled trials, quantitative studies, qualitative studies or mixed methods).

The study was published within the past 10 years.

Exclusion criteria

Documents were excluded based on the following criteria:

- If the document contained mostly descriptive or conceptual content, instead of empirical research.
- The content of the document was duplicated in another source that was retrieved (e.g. systematic reviews were excluded that reviewed articles already included as part of this scoping review).
- If the document was not related to the use of elastic therapeutic tape as a primary treatment modality.
- If the study was written in another language other than English.
- On-line web based reports were not included for this scoping review due to discrepancies in reliability and validity of data.

Charting the data and collating, summarising and reporting the results

Selected documents were reviewed by the three authors and information was extracted and tabulated using Excel software. The first author of this study initially examined all articles which were then reviewed by the remaining authors to enhance consensus and ensure higher accuracy in reporting of the results. The following categories of information for each study were extracted: publication date, location of the research, sample population characteristics (e.g. age, gender), health condition/injury, purpose of the study, duration of intervention, research approach, outcomes and level of evidence. The study search, selection and data extraction process are outlined below in Figure 1.

Results

Study quality

Study quality was assessed based on the McMaster Guidelines for Critical Review of Quantitative Studies which examines research approach, methodology, sample size, intervention, outcome measures and results. Studies were also classified using the Oxford Level of Evidence. Ratings are presented in Table 1 and Table 2.

Study Characteristics

Of the 14 studies that were included in this scoping review, seven articles were Randomised Controlled Trials (RCTs), four were single-group repeated measure studies, two were quasi-experimental studies, one was a case report. Four studies examined the use of kinesiotape with healthy populations, four studies involved the shoulder, three studies involved the neck, two studies involved the hand and forearm and one study examined lymphoedema. All RCTs had control groups that used sham tape, no tape or existing conservative treatments (e.g. massage, bandaging, manipulation, exercises and strengthening) and this was compared to intervention groups using elastic therapeutic tape.

Recommended application and wear-time of tape

Five studies described in detail how the elastic therapeutic tape was applied so that it could be replicated by the reader. Six articles in this scoping review examined the effects of elastic therapeutic tape after less than two days of taping. Five studies involved taping between three
to seven days\textsuperscript{15,16,18,19,25} and three studies involved taping between one week to three months.\textsuperscript{17,20,24} No long term follow-up was reported in any of the studies beyond three months.

Outcome measures

Outcome measures predominantly focused on changes in range of motion (ROM) and pain.\textsuperscript{14-19,24-26} Six studies that examined changes to pain with the use of elastic therapeutic tape all used the Visual Analogue Scale (VAS) as their primary outcome measure.\textsuperscript{14,15,17,18,25,26} The VAS has been widely used to assess pain severity by using a 10cm line with an 11 point scale (0 to 10).\textsuperscript{27} It is considered a valid and reproducible method of assessing pain as it takes little time to complete and allows cross cultural comparisons. Nevertheless, research also suggests that it is prone to response bias.\textsuperscript{27} One study used the Patient Pain Profile (P3) which is a standardised assessment used for people with chronic pain and also examines depression, anxiety and somatization.\textsuperscript{24}

ROM was assessed using a goniometer which is used widely in clinical practice. Although goniometric measurements are not technically a standardised assessment tool, it is able to provide reliable and accurate information for which norms have been reported by the American Society for Surgery of the Hand.\textsuperscript{28} The reliability of goniometric measurements has been found to be accurate provided standard procedures are followed. Three studies examined changes to grip strength using the standardised Jamar dynamometer\textsuperscript{4,22,23} which has been shown to have reliability and validity as an outcome measure.\textsuperscript{29} One article examined changes to throwing velocity using the radar gun\textsuperscript{21} one article used a Liberty electromagnetic tracking system and electromyography (EMG) system to record kinematic and myoelectric data\textsuperscript{23} and one article used measures of limb size for changes to lymphoedema.\textsuperscript{20} Only one study examined participant’s preferences for elastic therapeutic tape as an outcome measure.\textsuperscript{20}

Impact on pain

Six out of eight studies that examined changes in pain for carpal tunnel syndrome, biceps tendonitis, medial epicondylitis, rotator cuff pain, neck pain and shoulder pain found statistically significant differences in favour of elastic therapeutic tape.\textsuperscript{14,15,18,24-26} Of these, studies by Kaya et. al.\textsuperscript{15} and Thelan et. al.\textsuperscript{18} only found statistically significant differences in pain for the initial week of taping for shoulder pain (p<0.01) and immediately after taping for rotator cuff pain (p=0.005) respectively. No other longer-term benefits were reported in these studies when compared to the control groups. A case report by Garcia-Muro et. al.\textsuperscript{26} reported on one patient who had improvements in shoulder pain at nine days post taping of the shoulder. Although the randomised controlled trial by Saavedra-Hernandez et. al.\textsuperscript{17} did not yield statistically significant results in relation to decreased pain, it still reported that participants who received taping to the neck experienced reduced levels of pain. This change was, however, similar to the control group who received cervical thrust manipulations.

Impact on range of motion

Six studies examined the impact of elastic therapeutic tape on range of motion.\textsuperscript{14,16-19,26} Four of these studies involved changes in shoulder range of motion\textsuperscript{16,18,19,26} and two studies examined cervical range of motion.\textsuperscript{14,17} Of these, three studies found statistical significance for increased range of motion. Gonzalez et. al.\textsuperscript{14} and Thelan et. al.\textsuperscript{18} found statistical differences only immediately after tape application (p<0.001 and p=0.005 respectively). Saavedra-Hernandez et. al.\textsuperscript{17} obtained statistically significant improvements in cervical range of motion after one week of application.

Impact on strength

Three studies (one with a healthy athlete population, and two with athletes with upper limb conditions) examined changes in strength.\textsuperscript{4,22,23} Two measured grip strength, and one lower trapezius muscle strength following immediate application of elastic therapeutic tape. All found no statistically significant difference between groups.
Patient preference

Only one study examined patients’ preference of elastic therapeutic tape compared to an alternative intervention (in this case, bandaging for lymphoedema management). They found statistically significant results to support the argument that elastic therapeutic tape was preferred by participants (p<0.05). Reasons included longer wearing times, less difficult usage, increased comfort and convenience.

Discussion

Recent literature has suggested that elastic therapeutic tape (Kinesiotape) can provide a useful intervention for a wide range of conditions and is commonly used in clinical practice. This scoping review assessed the evidence on the use of elastic therapeutic tape for neck and upper limb disorders from 14 articles (that included 526 participants in total), comparing outcomes on pain, range of motion, strength and patient preference. The majority of studies were conducted in the United States (n=5), four were conducted in Taiwan, three from Spain and two from Turkey. All articles were published within the last ten years, with five of these studies being published in the last two years.

Only five of the studies reported sufficient detail regarding elastic therapeutic tape application to enable the reader to replicate it, which is disappointing. Also, follow-up time varied from between one day to three months. For some chronic and slow-to-recover conditions studied, including shoulder impingement, whiplash, lateral epicondylitis and repetitive strain injuries, this is clearly inadequate as changes are unlikely to be found in under three months.

Overall, this scoping review suggests that there is still inconclusive evidence of a beneficial effect with the use of elastic therapeutic tape for neck and upper limb conditions. This finding is consistent with systematic reviews conducted by Bassett, Lingman and Ellis, Morris et. al. and Kalron and Bar-Sela which examined the use of elastic therapeutic tape on a variety of conditions, not just the upper limb. These reviews concluded that there is limited, moderate level evidence indicating that elastic therapeutic tape is no more clinically effective than sham tape in the short term.

Overall, these systematic reviews reported that there is insufficient evidence to support the use of elastic therapeutic tape over other treatment modalities in clinical practice. However, as only a limited number of randomised controlled trials were able to be included in these systematic reviews, it is difficult to draw definitive conclusions on the effectiveness of elastic therapeutic tape.

Nevertheless, a common theme from this scoping review is that elastic therapeutic tape may be able to provide an immediate short-term reduction in pain. Five studies using pain as an outcome measure had moderate to high quality components as rated by the McMaster Critical Review of Quantitative Studies. Four of these studies supported the findings that elastic therapeutic tape can assist in decreasing pain. Although all studies were conducted over short periods of time (under three months) with relatively small sample populations (ranging from one to 80), this information can still form the basis for future research into the beneficial effects of elastic therapeutic tape on pain.

Another benefit that was found as part of this scoping review was that elastic therapeutic tape is a treatment modality that has few side-effects. No adverse events were reported in any of these studies as a result of the use of elastic therapeutic tape. Even though Saavedra-Hernandez et. al. did not find statistically significant differences, elastic therapeutic tape was found to be as equally effective as existing treatments for neck pain. Additionally, Tsai et. al. reported that participants preferred taping compared to bandaging due to increased comfort and ease of applicability. For this reason, the authors of this study suggested that elastic therapeutic tape may be a preferred option as it can be easily re-applied by the patient, there is less reliance on health professionals and it can potentially reduce costs since fewer treatment visits may be needed. This would be an interesting and important concept to evaluate in future research on elastic therapeutic tape.

Additionally, the inclusion of three studies with healthy participants may provide a useful opportunity for future research and intervention development. Although these studies did not yield any statistically significant results to demonstrate that elastic therapeutic tape was superior to other interventions, they may be useful in gaining insight into the feasibility of such studies, potential future patient populations, the safety of elastic therapeutic tape and the selection of appropriate outcome measures. According to the clinical trial taxonomy described by Dobkin, the included
studies may be considered Stage 2 (development-of-concept) or 3 (demonstration-of-concept) pilot studies, in which the components of the intervention were optimized, the specific outcome measures tested, and (in some cases) small groups of participants randomized to intervention or placebo/control groups. As such they can build toward and inform the design of more rigorous Stage 4 Proof-of-Concept Multi-centre Randomised Controlled Trials which can establish the generalised efficacy of the intervention across sites, and different treatment intensities or doses, thus leading to new evidence-based interventions.

Limitations

This scoping review was limited by the small number of articles included (n=14). As elastic therapeutic tape is still a relatively new treatment modality, there are only a small amount of studies that have been conducted concerning its clinical use to date. Although the articles in this scoping review were limited to the neck and upper limb, none of the studies investigated exactly the same condition or population and this impacted on the ability to conduct meta-analyses or make confident conclusions regarding the evidence of efficacy. Additionally, the variability in the application of elastic therapeutic tape to achieve a variety of outcomes makes analysis of studies into its effectiveness therefore difficult, as often the application was different between trials.

The main limitation of all articles included in this scoping review was the short intervention timeframes. Three studies only examined one-off assessments for the use of elastic therapeutic tape and long term effectiveness was only examined at a maximum of three months after application. It is important for future research to examine longer term benefits of elastic therapeutic tape as this would have greater applicability in clinical practice. Another limitation is that studies not published in English were excluded from this scoping review. Therefore, relevant published research in other languages may have been missed.

Conclusion

The findings of this scoping review suggest that elastic therapeutic tape may play a role in reducing short-term neck and upper extremity pain and that it may be a more convenient and comfortable alternative to existing conservative treatments. It is important to note, however, that the benefits of elastic therapeutic tape as reported in these studies are yet to be supported by adequate evidence from high quality, adequately powered studies. Ideally these studies would be multi-centred, include an adequate sample size/population, follow-up participants for at least 6 months, and consider the cost-effectiveness of elastic therapeutic tape compared to other existing interventions for neck and upper extremity disorders.

Declaration of Interests: The authors report no conflicts of interest.
References

16. Renner CM. *Kinesio tape and its effects on internal and external range of motion of the shoulder* [M.S.]. Ann Arbor, Indiana State University; 2012.


<table>
<thead>
<tr>
<th>Author, Publication Date, Location</th>
<th>Title</th>
<th>Research Approach / Methodology</th>
<th>Population</th>
<th>Health Condition – Intervention vs. Comparison</th>
<th>Outcome Measures and Results</th>
<th>Level of Evidence (Oxford)</th>
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</table>
Purpose: Changes to grip strength.  
Duration: One-off assessment.  
Intervention: Grip strength was tested without taping, with placebo taping, and kinesiotape. | Outcome measures: Maximum grip strength, absolute force sense error, and related force sense error. These were all assessed with a Jamar dynamometer.  
Frequency of outcome measurements: Each measurement was repeated three times on the same day.  
Results: No significant changes in maximum grip strength (p=0.936) in healthy participants.  
Clinical implications reported in the study: Kinesiotape on the forearm may enhance the force sense of forearm muscles (p=<0.05); however, future studies should investigate long term effects of kinesiotape on force sense. | 3b |
Purpose: Changes to strength, force sense, and pain.  
Duration: Three weeks.  
Intervention: Three tapping conditions were applied in both groups: (1) no taping, (2) placebo taping, and (3) kinesiotaping. Intervention is described in detail. | Outcome measure: Maximal wrist flexor strength and related absolute force sense errors using a dynamometer. Pain was assessed with the pain scale (pressure pain and pain tolerance).  
Frequency of outcome measurements: Three one-off assessments with an interval of one week between assessments.  
Results: No significant relationship in wrist flexor strength or force sense errors between the two groups with taping applied, except absolute force sense errors (p=0.037). Both the healthy group and the medial epicondylitis group in absolute force sense measurements had decreased errors and less pressure pain with kinesiotape and placebo tape.  
Clinical implications reported in the study: Kinesiotape may enhance absolute force sense and improve pain conditions for both healthy athletes and those with medial epicondylitis. | 2c |
Purpose: Changes to pain using kinesiotape in people with repetitive stress injuries. | Outcome measures: Patient pain profile (P3) to assess depression, anxiety, pain and somatization pre and post taping.  
Frequency of outcome measurements: Initial assessment and at two weeks.  
Results: Statistical significant difference | 2c |
<table>
<thead>
<tr>
<th>Study</th>
<th>Title</th>
<th>Country</th>
<th>Sample Size</th>
<th>Condition</th>
<th>Purpose</th>
<th>Duration</th>
<th>Intervention</th>
<th>Outcome Measures</th>
<th>Results</th>
<th>Clinical Implications</th>
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<tbody>
<tr>
<td>Garcia-Muro, F. et al. (2010)</td>
<td>Treatment of myofascial pain in the shoulder with Kinesio taping. A case report</td>
<td>Spain</td>
<td>One 20 year old female</td>
<td>Shoulder pain</td>
<td>Changes to pain and shoulder ROM</td>
<td>Two days.</td>
<td>Kinesiotape for two days.</td>
<td>ROM using a goniometer and patient-rated pain using the VAS (both standardised assessments).</td>
<td>The patient had almost full ROM and reported no pain at 9 days post tape.</td>
<td>Kinesiotape may help to decrease pain for repetitive stress injuries but future research is needed as this is only a small sample.</td>
</tr>
<tr>
<td>Gonzalez-Iglesias, J. et al. (2009)</td>
<td>Short-term effects of cervical kinesio taping on pain and cervical range of motion in patients with acute whiplash injury: a randomized clinical trial</td>
<td>Spain</td>
<td>41 adults (21 females, 20 males)</td>
<td>Acute whiplash</td>
<td>Changes to neck pain and cervical ROM</td>
<td>24 hour application.</td>
<td>Kinesiotape to the cervical spine (experimental group) and sham kinesiotape (control group).</td>
<td>Neck pain and cervical range of motion.</td>
<td>Patients receiving kinesiotape had a greater decrease in pain immediately post-application and at the 24-hour follow up (p&lt;0.001). The experimental group had greater improvement in ROM compared to the control group (p&lt;0.001).</td>
<td>The improvements in pain and ROM were small and may not be clinically meaningful. The authors recommended that future studies should investigate if kinesiotape provides enhanced outcomes when added to evidence-based physical therapy interventions over a longer period.</td>
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<tr>
<td>Hikita, Y. (2009)</td>
<td>The acute effects of Repeated/cross-over</td>
<td>21 college</td>
<td>Healthy college baseball</td>
<td>Outcome measures: Throwing velocity using a</td>
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<tr>
<td>Country</td>
<td>Study Title</td>
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<td>Participants</td>
<td>Condition</td>
<td>Purpose</td>
<td>Duration</td>
<td>Intervention</td>
<td>Outcome Measures</td>
<td>Results</td>
<td>Clinical Implications</td>
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<td>USA</td>
<td>Kinesio taping on throwing velocity in NCAA Division I, II, and III baseball pitchers</td>
<td>Cross-over, pre-test/post-test repeated measures design</td>
<td>17 adults</td>
<td>Shoulder impingement syndrome</td>
<td>Changes in throwing velocity</td>
<td>Two taping sessions separated by three days.</td>
<td>All participants received kinesiotaping and placebo taping over the lower trapezius muscle.</td>
<td>VAS, Oswestry Low Back and Neck Disability Indexes</td>
<td>No significant differences in neck (p=0.05), low back pain (p=0.05) and increased ROM (p=0.05).</td>
<td>Kinesiotape may help to decrease pain and increase function in surgeons with musculoskeletal pain; however, a larger sample needs to be assessed over a longer period of time.</td>
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<tr>
<td>Taiwan</td>
<td>The effect of taping on scapular kinematics and muscle performance in baseball players with shoulder impingement syndrome</td>
<td>Quasi-experimental study</td>
<td>32 adults</td>
<td>Surgeons who have musculoskeletal pain after surgery</td>
<td>Changes to kinematics, muscle activity and strength of the scapular region.</td>
<td>Four days.</td>
<td>All participants had kinesiotape applied to their neck and lower back.</td>
<td>DASH, VAS.</td>
<td>Statistically significant differences in neck (p=0.05), low back pain (p=0.05) and increased ROM (p=0.05).</td>
<td>Kinesiotape may help to decrease pain and increase function in surgeons with musculoskeletal pain; however, a larger sample needs to be assessed over a longer period of time.</td>
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<tr>
<td>Turkey</td>
<td>The effect of Kinesiotape application on functional performance in surgeons who have musculo-skeletal pain after performing surgery</td>
<td>Randomised controlled trial</td>
<td>55 adults</td>
<td>Shoulder impingement syndrome</td>
<td>Changes in throwing velocity</td>
<td>One-off assessment.</td>
<td>Each participant completed nine pitches without kinesiotape and then nine pitches with kinesiotape to the rotator cuff. Only nine pitches were done to avoid injury. Taping application was clearly described.</td>
<td>JUGS radar gun.</td>
<td>No significant effects on throwing velocity (0.705).</td>
<td>Future research would need to examine each participant’s physical condition. This study was conducted during the off-season which may have affected results.</td>
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### Table 1

<table>
<thead>
<tr>
<th>Reference</th>
<th>Country</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>Condition</th>
<th>Purpose</th>
<th>Duration</th>
<th>Intervention</th>
<th>Outcome Measures</th>
<th>Frequency of Outcome Measurements</th>
<th>Results</th>
<th>Clinical Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>Physical therapy modalities for the treatment of shoulder impingement syndrome</td>
<td>Intervention group: 25 adults (control group)</td>
<td></td>
<td></td>
<td>Purpose: Changes to pain at night, during the day and with motion.</td>
<td>Duration: Three intervals of three days using kinesiotape (experimental group) and two weeks of local modalities (control group).</td>
<td>Intervention: Kinesiotape (experimental group) and local modalities such as ultrasound, TENS, exercises and hot pack (control group). Both groups also received the same home exercise program. The intervention is described in detail.</td>
<td>Baseline, Week One and Week Two.</td>
<td>DASH – pre and post treatment.</td>
<td>Rest pain (p=0.001), night pain (p=0.01) and movement pain (p=0.001) were significant lower at the first week compared to the control group. No significant differences between the groups at Week Two.</td>
<td>The immediate effect of kinesiotape may have an advantage over local modalities due to shorter application durations. There may also be economic benefits such as less frequent visits and shorter duration of therapy. The authors discuss a need to study higher numbers of patients over a longer period.</td>
</tr>
<tr>
<td>Renner, C.M. et al. (2012)</td>
<td>USA</td>
<td>Kinesio tape and its effects on internal and external range of motion of the shoulder</td>
<td>Experimental pre-test/post-test randomised groups design</td>
<td>45 adults</td>
<td>Condition: Healthy participants.</td>
<td>Purpose: Changes in ROM.</td>
<td>Duration: Four days.</td>
<td>Intervention: Kinesiotape (experimental group) and no kinesiotape (control group).</td>
<td>Outcome measures: ROM. Frequency of outcome measurements: Initial assessment with kinesiotape, at day one of taping and day four.</td>
<td>Results: No statistically difference in shoulder ROM.</td>
<td>The immediate effect of kinesiotape may have an advantage over local modalities due to shorter application durations. There may also be economic benefits such as less frequent visits and shorter duration of therapy. The authors discuss a need to study higher numbers of patients over a longer period.</td>
</tr>
<tr>
<td>Saavedra-Hernandez, M. et al. (2012)</td>
<td>Spain</td>
<td>Short-term effects of kinesio taping versus cervical thrust manipulation in patients with mechanical neck pain: a randomized clinical trial</td>
<td>Randomised controlled trial</td>
<td>80 adults</td>
<td>Condition: Mechanical neck pain.</td>
<td>Purpose: To compare the effectiveness of cervical spine thrust manipulation to that of kinesiotaping applied to the neck.</td>
<td>Duration: One week. Intervention: Kinesiotape to the neck (experimental group) or two cervical thrust manipulations (control group).</td>
<td>Outcome measures: Neck pain (11 point scale), Neck Disability Index, Cervical ROM. Frequency of outcome measurements: Baseline and at one week by a blinded assessor.</td>
<td>Results: No significant difference for pain (p=0.736) using kinesiotape. The cervical thrust manipulation group had a greater improvement in cervical rotation (p=0.01).</td>
<td>Patients who received cervical thrust manipulation or kinesiotape had similar decreases in neck pain intensity, disability and similar changes in ROM, except rotation. Changes were small and not clinically meaningful. Future research should include a control group.</td>
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<tr>
<td>Thelan, M.D. et al. (2008)</td>
<td>USA</td>
<td>The clinical efficacy of kinesio tape for shoulder pain: a randomized, prospective,</td>
<td>Randomised controlled trial</td>
<td>42 adults</td>
<td>Condition: Rotator cuff tendonitis/impingement.</td>
<td>Purpose: Changes to shoulder pain and range of motion.</td>
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<td>Outcome measures: Self-reported pain and pain-free ROM. Frequency of outcome measurements: Initial assessment and following each three-day</td>
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Table 1

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Duration</th>
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<th>Results</th>
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<td>Tsai, H-J. et al. (2009) Taiwan</td>
<td>Randomised, single-blinded, controlled design</td>
<td>Two consecutive three day intervals</td>
<td>Kinesiotape (experimental group) and sham kinesiotape (control group)</td>
<td>Improved pain-free shoulder abduction immediately after tape application (p=0.005). No other differences between groups for ROM, pain, disability. Kinesiotape may be beneficial in improving pain-free ROM for people with shoulder pain.</td>
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<td>Tsai, H-J. et al. (2009) Taiwan</td>
<td>Double-blind, clinical trial</td>
<td>Randomised, double-blind, clinical trial using a repeated measures design</td>
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<td>Ujino, A. (2012) USA</td>
<td>Randomised-groups design</td>
<td>Four days</td>
<td>Participants were randomly allocated to four groups (control group, kinesiotape only, stretch only, kinesiotape and stretch).</td>
<td>No statistical difference for shoulder ROM using kinesiotape (p=0.076). Stretching is more effective on improving shoulder ROM compared to kinesiotape.</td>
<td>For people with lymphoedema, kinesiotape could replace the use of bandages.</td>
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Table 2: McMaster Critical Review of Quantitative Studies

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+, criterion achieved; -, criterion not achieved; *, not discussed

The numbers refer to the questions below:
1. Was the study purpose clearly stated?
2. Was relevant background literature reviewed?
3. Was the design appropriate for the study question?
4. Was the sample described in detail?
5. Was the sample size justified?
6. Were the outcome measured reliable?
7. Were the outcome measured valid?
8. Was the intervention described in detail?
9. Was contamination avoided?
10. Was co-intervention avoided?
11. Results were reported in terms of statistical significance?
12. Were the analysis methods appropriate?
13. Clinical importance was reported?
14. Drop-outs were reported?
15. Conclusions were appropriate given study methods and results?

High: >75% of the criteria has been fulfilled (12/15)
Moderate: 50-75% of the criteria has been fulfilled (8-11/15)
Low: <50% of the criteria has been fulfilled (<7/15)
Figure 1: Charting the data

Step 1: Research Question
“What is known from the existing literature about the use, purpose and effectiveness of elastic therapeutic tape in treating neck and upper extremity conditions?”

Step 2: Search Strategy
Search of electronic databases: OVID Medline, Cinahl and ProQUEST. Grey literature was searched from ProQUEST Dissertations and Theses.
N = 866

Step 3: Study Identification and Selection
Studies selected based on the inclusion criteria: The document reported on a primary study of elastic therapeutic tape, the document provided a description of how the elastic therapeutic tape was used for a particular condition and/or population, the study population included people with neck and upper extremity conditions, the study was written in English, participants in the studies were adults over 18 years of age and all study designs were included.
N = 14

Step 4: Data Extraction
Documents reviewed for publication dates, location, population characteristics, health condition, techniques for applying elastic therapeutic tape, study purpose, duration, outcomes, research approaches and level of evidence.