

## Effectiveness Of Kinesio Taping In The Management Of Myofascial Pain Dysfunction Syndrome - A Systematic Review

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### ABSTRACT:

#### AIM:

To evaluate the effectiveness of kinesio taping in the management of myofascial pain dysfunction syndrome.

#### METHODS AND MATERIAL:

The studies included in this review are randomized controlled trials that are directly related to testing the effectiveness of kinesio taping in the management of myofascial pain dysfunction syndrome. For this systematic review, nine bases (PubMed, Cochrane, Medline, Scopus, Grey Literature, Elsevier, Wiley Online library, Science direct, OSF) were searched using MeSH terms "myofascial pain dysfunction syndrome, kinesio taping, myofascial trigger points, musculoskeletal disorders". A total 86 articles were screened after duplication Six articles were identified that met the inclusion and exclusion criteria. The experiments and the results in these articles were then analyzed.

#### RESULT:

All the six articles identified support the fact that kinesio tape application positioned directly over the Myofascial trigger points may be effective for pain relief and increasing range of motion in patients with Myofascial Pain Dysfunction Syndrome.

#### CONCLUSION:

This systematic review confirms that kinesio taping is indeed effective in management of pain in patients with Myofascial Pain Dysfunction Syndrome.

**KEYWORDS:** myofascial pain dysfunction syndrome, kinesio taping, myofascial trigger points, musculoskeletal disorders.

### INTRODUCTION:

Myofascial pain dysfunction syndrome (MPDS) is a form of musculoskeletal disorder that originates from a painful trigger point on a muscle or related fascia. It is a common cause of musculoskeletal pain.<sup>[1]</sup> It is usually characterized by spasm of the associated muscle, tenderness, restriction in range of motion and autonomic dysfunction along with pain arising from the trigger points on stretched bands of muscle or fascia.<sup>[2]</sup> It is usually caused due to poor postures, neuromusculoskeletal disorders, or other systemic diseases. Chronic repetitive minor muscle strain, bursitis, arthritis, or disc lesions may also induce Myofascial Pain Dysfunction Syndrome.<sup>[3]</sup> An initial injury to muscle fibers may cause development of trigger points. This injury could be a major trauma or repetitive micro-trauma to the muscles. This injured muscle causes pain and stress. As the stress on the fibers continues, additional trigger points occur.<sup>[1]</sup>

Clinically, myofascial pain is observed as local pain in the muscle, often with referred pain.<sup>[3]</sup> Trigger points produce spontaneous and recognizable pain when they are active, whereas, they produce nonrecognizable local or referred pain upon stimulation when they are latent. Myofascial trigger points are hyperirritable

spots in a taut band of muscle fibers.<sup>[4]</sup> During physical examination, the Myofascial Trigger Points (MTrP) in a taut band of skeletal muscle can be palpated and local twitch response can be elicited by snapping of the trigger point. For the diagnosis of MTrP, 'spot tenderness', 'taut band', and 'pain recognition' are the three basic criteria, and 'referred pain' and 'local twitch responses' are the signs of presence of a trigger point. Patients with myofascial pain dysfunction syndrome usually begin with one active MTrP, called primary MTrP in the affected muscle. When under inappropriate treatment, expansion of pain region and additional active MTrPs, called secondary MTrPs, will develop.<sup>[3]</sup>

Management of Myofascial Pain Dysfunction Syndrome can be based on preventing the mechanism that causes the development of trigger points. MTrPs develop due to excessive release of acetylcholine during muscle contraction that leads to prolonged shortening of the muscles. Therefore, inactivating the trigger points is the treatment option.<sup>[5]</sup>

Both invasive and conservative interventions are effective for the treatment of Myofascial pain dysfunction syndrome. Invasive treatments like local anesthetics, corticosteroids and botulinum toxin injections and dry needling are effective. MTrP dry needling (MTrP-DN) is recommended to relieve pain instantly. Active and latent MTrP-DN could reduce pain and sensitivity in patients with MPDS.<sup>[4]</sup> Other noninvasive procedures like spray freeze and stretch, transcutaneous electrical stimulation, ultrasound, massage, ischemic compression therapy decrease the pain by deactivating trigger points and loosening taut muscle bands.<sup>[3]</sup>

The Kinesio taping (KT) technique developed by Dr. Kenzo Kase, is a non-invasive treatment procedure which uses latex-free and quick-drying tapes designed to mimic human skin in its thickness and elasticity. This concept was initially developed in Japan in 1979 and United States in 1990s. The elastic tape has the capability of stretching up to 130-140% of its initial length ensuring free mobility of muscle or joint. After applying the tape, convolutions are formed on the skin, thereby increasing the space between the skin and the muscles. As the skin is lifted, the flow of blood and lymph is promoted.<sup>[6]</sup>

Kinesio taping is used for the treatment of a number of musculoskeletal and neuromuscular disorders. It provides benefits like restoring proper muscle function by supporting weakened muscles, reducing congestion by improving the blood flow and lymphatic fluid, decreasing pain, correcting misaligned joints, and enhancing proprioception through increased stimulation of mechanoreceptors.<sup>[7]</sup> Kinesio Taping application also aids in neurological disorders, sensory deficits, reduce spasticity of muscles, rehabilitation protocols and prevention of sports injuries.<sup>[5][6]</sup> It is also applied in the treatment of lymphatic disorders like lymphatic insufficiency and lymphedema.<sup>[6]</sup>

KT acts by activating the gate control mechanism and descending inhibitory mechanisms through sensory stimuli and decreases inflammation, modifies superficial and deep fascia function. This results in decrease in pain thereby normalizing muscle functions, increasing vascular circulation and reorganizing articular disarrangements.<sup>[2]</sup> The procedure is non-invasive, painless and is easily applied by adhering tapes on the surface of the skin corresponding to the affected muscle, thus providing muscular stability, which prevents the abnormal movements of the muscles.<sup>[8]</sup> Bands are usually changed every 3 days during the treatment to achieve an immediate analgesic effect.<sup>[2]</sup>

#### **OBJECTIVES:**

The objective of this systematic review is to evaluate the effectiveness of kinesio taping in the management of Myofascial Pain Dysfunction Syndrome by reviewing six finalized articles and studying in detail their results to showcase a conclusive result on the subject.

#### **MATERIALS AND METHODS:**

Only randomized controlled trials were included in this study and the articles were narrowed down using certain inclusion and exclusion criteria.

**SEARCH STRATEGY AND ELIGIBILITY CRITERIA:**

Nine search engines (PubMed, Cochrane, Medline, Scopus, Grey literature, Elsevier, Wiley online library, Science direct, OSF) were searched using the keywords “myofascial pain dysfunction syndrome, kinesio taping, myofascial trigger points, musculoskeletal disorders” and 86 related articles were obtained after deletion of duplicates. All 86 articles were read thoroughly and out of the 86 articles, 6 articles were finally selected on the basis of the inclusion and exclusion criteria described below:

**INCLUSION CRITERIA:**

1. Full text articles available.
2. Articles in English.
3. Articles containing randomized controlled trials.
4. Studies taken from 2014 – 2017.

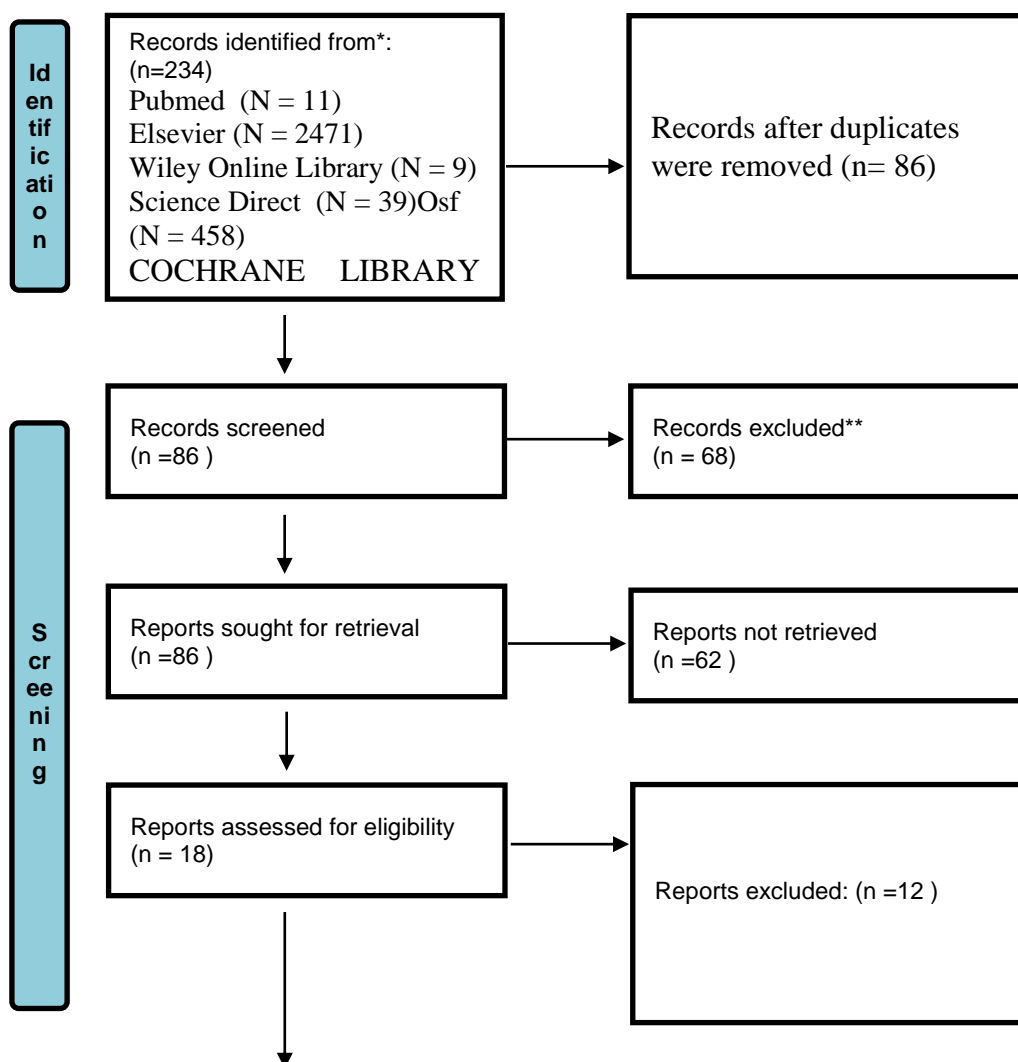
**EXCLUSION CRITERIA:**

1. Articles without information on volunteers.
2. Pilot studies.

**RESULT:**

The studies are tabulated in the following figure and tables.

FIGURE 1: FLOW DIAGRAM SHOWING THE NUMBER OF STUDIES IDENTIFIED, SCREENED, ASSESSED FOR ELIGIBILITY, EXCLUDED AND INCLUDED IN THE SYSTEMATIC REVIEW.



In cl u d e	Studies included in review (n = 6)
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**TABLE 1- CHARACTERISTICS OF INTERVENTIONS IN THE INCLUDED STUDY**

S.NO	AUTHOR NAME	YEAR	SAMPLE SIZE	SAMPLE CHARACTERISTICS	DURATION	INTERVENTION
1	Youngsook Bae et al <sup>[9]</sup>	2014	42 patients	17 male and 25 female between age 20 to 30 years with latent myofascial triggerpoints of the sternocleidomastoid muscle.	14 days	<b><u>Group 'A'</u></b> - 23 subjects Kinesio Tape <b><u>Group 'B'</u></b> - 19 subjects Control group
2	GülcanÖztürk, et al <sup>[10]</sup>	2015	37 patients	37 patients with age between 18 and 50 years and symptom duration of more than 2 weeks with neck and/or upper back pain and an active myofascial trigger point in the upper trapezius region and taut palpable band.	1 month	<b><u>Group 'A'</u></b> - 20 subjects Kinesio tape <b><u>Group 'B'</u></b> - 17 subjects Placebo group
3	Saime Ay et al <sup>[11]</sup>	2015	61 patients	61 patients with cervical MPDS involving the upper neck and levator scapula muscle with symptom duration of more than 3 months.	14 days	<b><u>Group 'A'</u></b> - 31 subjects Kinesio Tape <b><u>Group 'B'</u></b> - 30 subjects Placebo group
4	Abdelfattah, O et al <sup>[12]</sup>	2016	30 patients	14 males and 16 females with myofascial pain syndrome, of age 20 to 50 years.	3 days	<b><u>Group 'A'</u></b> - 15 subjects Kinesio tape <b><u>Group 'B'</u></b> - 15 subjects Control group

5	Fahimeh Hashemir ad et al <sup>[13]</sup>	2016	51 patients	51 patients with MPDS involving the piriformis muscle.	3 days	<b>Group 'A'</b> - 33 subjects Kinesio tape <b>Group 'B'</b> - 18 subjects Control group
6	Leonid Kalichman, et al <sup>[14]</sup>	2017	32 patients	32 patients aged 18-35 years with presence of at least one MTrP in the upper trapezius and/or gastrocnemius muscles.	1 day	<b>Group 'A'</b> - 16 subjects Kinesio tape <b>Group 'B'</b> - 16 subjects Placebo group

Table 1 shows information on the final included articles such as the author name, the number of volunteers and their gender. The schedule of the experiment from the pre-experimental procedure period till the final results were obtained is also mentioned. The experiments were conducted as a multiple group experiment consisting of controlled group or placebo group and experimental group in them. The information on the conditions for each group is also described.

**TABLE 2 – CHARACTERISTICS OF OUTCOME AND RESULTS**

S.N O	AUTHOR NAME	YEAR	PRIMARY OUTCOME	RESULT
1	Youngsook Bae et al <sup>[9]</sup>	2014	Primary outcome – Kinesio taping is thought to be an intervention method that can be applied to latent myofascial trigger points.	Evaluation after 14 days shows relief of pain in the SCM in the experiment group, as the Pressure Pain Threshold score decrease significantly and range of motion of temporomandibular joint increase significantly. pain in the muscle was relieved, as the VAS (p<0.01) and PPT (p<0.05) score decrease and ROM (p<0.05) of the joint increase

2	GülcanÖztürk, et al [10]	2015	Primary outcome – Patients with MPDS receiving application of Kinesio taping exhibited significant improvements in pain and upper trapezius muscle strength.	The changes in Visual Analog Scale scores and trapezius muscle strength were significantly different along with pain relief immediately after application in kinesio tape group. Evaluation after 1 month shows improvement in pain and trapezius muscle strength in kinesio tape group. pain level and trapezius muscle strength( $p \leq 0.0001$ ) in experimental group, reduction in VAS scores ( $p < 0.0001$ ) was also observed.
3	Saime Ay, et al [11]	2015	Primary outcome – Kinesio tape technique show improvements on pain and range of motion.	Evaluation done after 14 days shows reduction in pain severity, disability and increase in range of motion in kinesio tape group. There was no significant change in the placebo group.
4	Abdelfattah, O.et al [12]	2016	Primary outcome – Kinesio tape technique is effective method of treatment of neck myofascial pain syndrome.	Evaluation done after 3 days shows significant increase in pressure there was significant improvement on pain and PPT values ( $p < 0.05$ ) in both groups. But no improvements were seen in the cervical range of motion ( $p > 0.05$ ).

5	FahimehHashemirad et al <sup>[13]</sup>	2016	Primary outcome – Kinesio tape application may be effective for pain relief and increasing range of motion in patients with myofacial trigger points in the piriformis muscle.	There was significant improvement in pain and joint mobility immediately on application and at a 72-hour follow up in the kinesio tape group. There was no significant change were found on dependent variables in the control group.
6	Leonid Kalichman, Inbar et al <sup>[14]</sup>	2017	Primary outcome – Kinesio taping application positioned directly above the MTrPs prevents an increase in sensitivity immediately after application and prevent further sensitization up to 24 hours later.	The active intervention group showed increase Pressure Pain Threshold (the spots were less sensitive) on kinesio tape application on the trigger points of trapezius muscle in 20 minutes and after 24 hours returned to the original values. The control group showed lower Pressure Pain Threshold values at 20 minutes after application denoting that the spots were more sensitive.

Table 2 shows the author name and the year the studies were conducted, duration of each experiment along with the results and the primary outcome. According to Youngsook Bae *et al*<sup>[9]</sup> the results show that pain in the SCM was relived, as range of motion of temporomandibular joint increase significantly. According to GülcanÖztürk *et al*<sup>[10]</sup> trapezius muscle strength were significantly increased immediately after application of kinesio tape. Results of studies conducted by Saime Ay *et al*<sup>[11]</sup>, Abdelfattah *et al*<sup>[12]</sup>, FahimehHashemirad *et al*<sup>[13]</sup> also stated decrease in the pain severity, increase in range of motion of joint and increased muscle strength immediately after application

**FIGURE 2- CHARACTERISTICS OF BIAS IN DIFFERENT STUDIES TAKEN FOR REVIEW**

S. NO	AUTHOR NAME	RANDOM SEQUENCE GENERATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	OTHER BIAS
1	YoungsookBae <sup>[9]</sup>	+	+	-	-	+	?	-
2	GülcanÖztürk, DuyguGelerKülü, NilgünMesci,	+	+	+	-	+	+	-

	Ayşe DuyguŞilte, EceAydog <sup>[10]</sup>							
3	Saime Ay, HaticeEcemKonak, DenizEvcik, SibelKibar <sup>[11]</sup>	+	+	+	-	+	?	-
4	Abdelfattah, O. Kattabei, S. Nasef, A. Semaya <sup>[12]</sup>	+	+	+	?	+	?	-
5	FahimehHashemiradNoureddinKarimi, RoshanakKeshtar <sup>[13]</sup>	+	+	?	?	+	-	-
6	Leonid Kalichman, Inbar Levin, ItzhakBachar, Elisha Vered <sup>[14]</sup>	+	-	+	?	+	-	-

+: indicates low risk of bias    -: indicates high risk of bias    ?: indicates unknown

Table 3 shows the experiments conducted byGülcanÖztürket *al*<sup>[10]</sup>, show a relatively low risk of bias as opposed to studies conducted byLeonid Kalichmanet *al*<sup>[14]</sup> andYoungsook Baeet *al*<sup>[9]</sup>whose experiment has a significantly higher risk of bias. There were many unknown factors in the experiment conducted by FahimehHashemiradet *al*<sup>[13]</sup> and Abdelfattahet *al*<sup>[12]</sup> making it more difficult to conclude the results. The rest had comparatively moderate risk of bias. It is important to take these values into consideration as the reliability of the resultdepends on there being a low risk of bias in the experiment done.

**DISCUSSION:**

Youngsook Bae in 2014conducted a study in patients with latent myofascial trigger points of the sternocleidomastoid muscleto identify the changes in the myofascial pain and range of motion of temporomandibular joint on application of Kinesiotape. The trigger points were diagnosed by presence of palpable taut bands in the skeletal muscles, hypersensitive spots in the taut bands of muscles, visible local twitch on palpation, and referred pain when a sensitive spot was palpated<sup>[15]</sup>.The subjects were randomly divided into 23 patient in experimental group that would receive Kinesio taping and 19 patients in control group who would not receive Kinesio taping.The tape was applied on the sternocleidomastoid muscle three times a week for two weeks. In all subjects the intensity of pain on palpation of trigger point was measured using the visual analog scale (VAS) and pressure pain threshold (PPT) before and after the intervention. Also, the range of motion (ROM)of temporomandibular joint was measured in millimetersas the distance between the median clefts of the upper and lower teeth using Goniometry. In the experiment group, it was found that pain in the muscle was relieved, as the VAS (p<0.01)andPPT (p<0.05) score decrease and ROM (p<0.05) of the joint increase. But the control group did not show any change in VAS, PPT, ROM values. Therresults indicate that Kinesio taping was effective in reducing muscle pain as a result fromexcessive stress<sup>[9]</sup>.



Gülcan Öztürk, in 2015 experiment was a randomized placebo-controlled, single-blinded study. It was done on 37 patients with neck and/or upper back pain for more than 2 weeks and an active myofascial trigger point in the upper trapezius region. The aim of the study was to determine the short and mid-term effects of Kinesio taping. The subjects were randomly divided into experiment group of 20 patients who received Kinesio taping for the upper trapezius muscle, and placebo group of 17 patients who received a sham Kinesio taping application. Muscle pain was measured using Visual Analog Scale (VAS) and Pressure Algometry. Trapezius muscle strength data were collected before, immediately after application and at one month follow up. The Kinesio tape used in this study was waterproof, porous, and adhesive, of width 5 cm and thickness 0.5 mm. The experimental group received a standardized therapeutic kinesio tape application while the placebo group received improper kinesio tape application applied with no tension. The two different applications looked similar. The kinesio tape was applied twice for one week with one day rest between applications. Results indicate improvement in pain level and trapezius muscle strength ( $p \leq 0.0001$ ) in experimental group, reduction in VAS scores ( $p < 0.0001$ ) was also observed. Analysis of pressure algometry scores ( $p < 0.0001$ ) also demonstrated improvement. Reduction in pain and VAS values were noticed even after a period of one month. The results were in agreement with that of the randomized clinical trial conducted in 2014 by Wen-Ling Chang *et al.*<sup>[16]</sup> which concluded that Kinesio taping improved movement and range of cervical rotation<sup>[10]</sup>.

Saime Aya, 2015 conducted a randomized, double-blinded placebo controlled study. Sixty one patients with cervical MPDS with symptoms lasting for more than three months were randomly assigned into two groups. A study group of 31 subjects was treated with Kinesio taping and a placebo group of 30 subjects were treated with sham taping 5 times in intervals of 3 days for 15 days. The aim of the experiment was to investigate the effectiveness of Kinesio Taping on pain, pressure pain threshold (PPT), cervical range of motion in patient with cervical myofascial pain dysfunction syndrome. This study was similar to that conducted by Hernandez *et al.*<sup>[17]</sup> in 2012. Pain was assessed using Visual Analogue Scale (VAS), Pressure Pain Threshold (PPT) and cervical range of motion was measured using Goniometry. Values were measured before and after the treatment. Results at the end of the therapy was that there was significant improvement on pain and PPT values ( $p < 0.05$ ) in both groups. But no improvements were seen in the cervical range of motion ( $p > 0.05$ ). Therefore, the study was concluded by stating that KT is a non-invasive, painless procedure that has minimal side effects and is well tolerated in the treatment of MPDS. It helps relieve pain in a short period and can be used as an alternative therapy<sup>[11]</sup>.

A. Abdelfattah, 2016 conducted a study to show the efficiency of kinesio taping on pain threshold (PPT), level of function of muscle and pain severity level on patients with cervical myofascial pain syndrome in a randomized clinical trial. 30 subjects with cervical MPDS were randomly assigned into Group 'A' and Group 'B' using simple randomization technique, each group having 15 subjects. Group 'A' (study group) received kinesio tape for three days while Group 'B' (control group) did not receive any therapy. Pressure algometry and visual analogue scale (VAS) were used to evaluate subjects before and after the therapy. Results indicate a significant increase in PPT values (46%) and decrease in pain level (52%) with the study group ( $p \leq 0.05$ ) while there was no significant difference in the control group. Therefore, the study concluded that Kinesio tape technique is an effective modality in treatment of myofascial pain dysfunction syndrome and neuro muscular disorders.<sup>[12]</sup>

Fahimeh Hashemirad, 2016 conducted a study to determine the effects of kinesio taping on pain and range of motion (ROM) in patients with myofascial trigger points in the piriformis muscle. 51 patients with MPDS of the piriformis muscle were allocated to experimental group consisting of 33 subjects and control group consisting of 18 subjects. The experimental group received Kinesio tape with unloading technique on the

muscle for three days. Muscle pain and rotation of joints were measured before, immediately after application, and at a 72-hour follow up. Results revealed significant improvements in pain and range of motion immediately on application of kinesio tape and at a 72-hour follow up in the experimental group, whereas no significant changes were seen in the control group. Therefore, it was suggested that kinesio taping application is effective in relieving pain and increasing function of joint in patients with myofascial trigger points. [13].

Leonid Kalichman, 2017<sup>[14]</sup> conducted randomized, single-blinded, controlled trial on 32 patients aged 18-35 years with the presence of at least one trigger point on the upper trapezius muscle to evaluate the short-term effects of kinesio tape application on myofascial trigger points. Participants were randomly assigned to an active intervention group consisting of 15 subjects and a control group of 15 subjects. Kinesio taping was applied on the muscle by positioning three "I" strips with tension at the base directly above the trigger point in trapezius muscle for the study group, but in the control group, the kinesio tape was placed a little away from the actual trigger point. Results show that kinesio taping prevents increase in sensitivity of the trigger points *i.e.* a decrease in PPT values immediately after application. It also prevents sensitization up to 24 hours while there is no difference observed in the control group<sup>[14]</sup>.

#### **CONCLUSION:**

The conclusion of this systematic review is that all the 6 clinical trials that were done on subjects affected with myofascial pain dysfunction syndrome supports the statement that application of kinesio tape directly above the myofascial trigger points on the skin is effective in relieving muscle pain, increasing functionality and tone of the muscles. It also improves range of motion of the associated joint. Kinesio taping is especially helpful when immediate relief from pain is required. Kinesio taping increases the effectiveness when it is used as an adjunct with other treatment modalities like manual pressure release, spray freeze and stretch, transcutaneous electrical stimulation, ultrasound, massage, ischemic compression therapy etc. Therefore, kinesio taping is an effective, non invasive therapy option in management of MPDS.

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