DOI: 10.7860/JCDR/2022/46811.16115

Original Article

Physical Medicine and Rehabilitation Section

Effect of Kinesio Taping in Patients with Cervical Radiculopathy: A Longitudinal Study

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ABSTRACT

Introduction: Cervical radiculopathy is the clinical condition when a nerve root in the cervical spine becomes inflamed or damaged due to compression because of various reasons resulting in a change in neurological function. Kinesio taping is a treatment method used by physical therapists to improve symptoms associated with musculoskeletal disorders. It can be stretched to 140% of its original length before being applied to the skin. It subsequently provides a constant pulling (shear) force to the skin, unlike traditional athletic tape.

Aim: To study the effect of kinesio taping on pain, neck disability and physical function of upper limb in cervical radiculopathy.

Materials and Methods: This longitudinal study was carried out at SGT Hospital Gurugram, Haryana, India, between February 2018 to August 2018. Fifty subjects, aged 18-50 years with positive response for the 4 test item cluster described by Wainner RS et al., were included in the study and were given manual therapy treatment, cervical stabilisation exercises and kinesio taping. There were three sessions per week for a total of four weeks. Neck Disability Index (NDI), Numeric Pain Rating Scale (NPRS) and Disability of the Arm, Shoulder and Hand (DASH) questionnaire were the outcome measures. The readings were noted at pre-level (0 week), mid-levels (at 2 weeks weeks) and at post-levels (at 4 weeks weeks). Comparison of different values was done using paired t-test. Level of significance was taken at p-value <0.05.

Results: The mean age of patients was 48.1±11.9 years. The NDI scores at 0 weeks, at 2 weeks, at 4 weeks were 46.00±4.96, 30.48±4.56, 14.84±3.94, respectively. The DASH scores at 0 weeks, at 2 weeks, at 4 weeks were 59.52±7.55, 34.49±8.70, 0.74±0.69, respectively. The NPRS scores at 0 weeks, at 2 weeks, at 4 weeks were 8.72±0.7, 5.10±1.07, 0.74±0.69. All the variables showed significant improvement between different intervals.

Conclusion: Kinesio taping method along with manual therapy treatment, cervical stabilisation exercises was effective in treating patients with cervical radiculopathy.

Keywords: Cervical stabilisation exercises, Disability of the arm, Manual therapy, Neck disability index, Numeric pain rating scale, Shoulder and hand questionnaire

INTRODUCTION

Cervical radiculopathy is a musculoskeletal disorder which causes radiating pain with or without motor or sensory changes and can be aggravated by different postures or movements of neck. Compression of the nerve root or inflammation is frequently caused by herniation of the cervical disc or by spondylotic abnormalities such as bone spurs [1]. The symptoms of cervical radiculopathy vary depending on which nerve root is affected. Arm discomfort is the most prevalent cause for individuals to seek medical attention, even if they may go through several phases of neck pain. Shivering, discomfort, weakness, and numbness in the upper extremity are common complaints patients report, resulting in functional limitations [2]. It constitutes 5-36% of all the radiculopathies and affects both the sexes equally with affliction most common in fourth to fifth decades of life [3]. The cervical C5 and C6 nerve roots are the most often affected, and are often the result of disc herniation or spondylosis in the C5-C6 or C6-C7 discs. It has been estimated that there is an increased prevalence rate for cervical radiculopathy in the fifth century for the population as a whole (203 per 1 lakh) [4].

The natural course of cervical radiculopathy is difficult to outline. A favourable course of six months has been mentioned in different literature, with full recovery taking between 24 and 36 months. There is less evidence on prognosis; however certain factors such as recovery time more than 6 months, increased pain scores, psychosocial factors, radicular signs, sickness leaves and factors related to surgery have been found to be in relation with bad outcomes [5]. Cervical radiculopathy patients often exhibit painful muscle spasms and neck motions during physical examinations. The most frequent neurologic finding also involves the triceps, which is the most widespread. This is due to decreased tendon reflexes from deep tissues. Information regarding cervical myotomes and dermatomes is helpful in diagnosis, but referred pain may be also found outside dermatomal borders [6].

Information regarding cervical myotomes and dermatomes is helpful in diagnosis, but referred pain may be also found outside dermatomal borders [6]. Due to less number of high-quality studies, unfortunately, the definitive efficacy of different treatments for cervical radiculopathy is still unclear. However, it can be generally claimed that most patients benefit from conservative therapies including training, exercise, physical modalities, manipulation, cervical traction, cervical collar, and drug treatments such as non steroidal anti-inflammatory drugs treatment [7].

Kinesio taping is used in sports injuries and musculoskeletal disorders. This technique was first introduced by Japan based therapist Kase and in present time this technique is very useful in pain treatment [8]. This tape due to its elasticity can be elongated up to 140% of the original length which is approximately the normal stretch capability of skin, for treating musculature-related conditions. Kinesio tape when applied over the injured skin or different parts of the muscle increases the muscle strength, spasm is relieved, improves pain, blood circulation and lymph reflux decreases edema, and also stabilises joints which in turn increase range of motion [9].

The aim of the study was to examine the impact of brachial plexus kinesio taping on the pain, neck disability and physical function of upper limb in cervical radiculopathy by Neck Disability Index (NDI), Numeric Pain Rating Scale (NPRS) and Disability of the Arm, Shoulder and Hand (DASH) questionnaire.

MATERIALS AND METHODS

This longitudinal study was conducted at SGT Hospital Gurugram, Haryana, India. The study was approved by the Ethical Research Committee, (Ref. No. SGTU/FMHS/D./96). The study was conducted between February 2018 to August 2018 and the duration of protocol for each subject was four weeks.

Inclusion criteria

- Age group between 18-50 years
- Pain, paraesthesia , numbness less than three months in the upper limb with cervical or periscapular discomfort.
- Positive response for the 4 Wainner RS et al., test's item cluster:
  - Ipsilateral cervical Spurling,
  - Upper Limb Tension Tests (ULTTs),
  - Neck Distraction,
  - Spurling tests range (ROM) less than 60° [10].
- Six diagnostic questions for cervical radiculopathy, which comprise the following questions:

1. Which are the most annoying symptoms: Pain in neck or arm, tingling, loss of feeling or numbness.
2. Where are the symptoms most troublesome: Either in neck, scapula, shoulder, arm above or below elbow or hand or up to Fingers.
3. Behaviour of symptoms- Variable, Constant or Intermittent.
4. Complete limb numbness.
5. Are the symptoms not letting you to sleep?
6. Does the movement of neck increasing or decreasing the radiating pain in arm, complaints of pain radiating to upper extremity that was provoked or exacerbated by cervical range of motion, paraesthesia in dermatomal pattern [11].

Exclusion criteria

The exclusion criteria was untreated discomfort, people who have had cervical operations, rheumatism, cancer, cord myelitis, and vertebrobasilar disease are all possible causes of cervical instability, previous reactions to kinesio taping, respiratory diseases prior surgery to cervicothoracic spine, osteoporosis [12].

Procedure

Fifty subjects fulfilling the inclusion criteria were taken for the study. All the subjects were explained the objective of the research and were requested to sign the consent form if they wanted to participate in the study. The subjects of the study were given physiotherapy treatment which included cervical stabilisation exercises, manual therapy and application of kinesio tape. All participants received three sessions over the next four weeks The duration of the therapy session was for 30-60 minutes. The outcome variables were taken at pre (before the start of the study, at 0 week), mid (2 weeks) and post (4 weeks) levels.

Manual therapy protocol: Each session of treatment included manual therapy methods. Based on the biomechanical examination physical therapist choose the manual therapy techniques. Rotations, lateral glides in neutral, posteroanterior glides, posteroinferior medial glides, anterosuperior anterior glides, and anterosuperior anterior glides were all authorised by the physical therapists. According to Maitland and co-workers, each technique was done for 10-30 second repetitions with a force grade of 3-4. Static manual cervical traction was given for five minutes after the mobilisation treatments were completed [13].

Cervical stabilisation exercises: For the stabilisation exercise, the bracing technique of cervical area along with deep neck flexors activation was performed. The exercises consists of bracing technique in neuro-development stages in different positions such as prone, supine, quadrupedal bipedal for the cervical spine [14]. For deep neck flexors activation exercise in supine lying, a sphygmomanometer was used, in which the cuff was placed suboccipitally. From a starting point of 20 mmHg, subjects were prompted via feedback to achieve a goal of 30 mmHg by gradually increasing the pressure by 5 mmHg in 2 mm increments. They were then taught to move their heads in the same way they would say "yes" in order to confirm their answer. The patient's ability to maintain a steady pressure for 10 seconds was determined. For each new goal level, the muscular contraction time was increased to 10 seconds. Individual had to perform at least 10 repetitions before they progressed to next target [15]. In the rest of other exercises in prone, quadrapedal and bipedal position, It was held for 10 seconds at every position, with 10 repeats for each participant. Exercises for range of motion of the extremities were performed while the spine was kept in certain postures of stability. Repetitions were gradually increased from 8-12 for all exercises.

Isometric exercises: Isometric exercises of cervical area was done directly obliquely, toward right side and then left, forward and then backward directly while stable spine is maintained with elastic therabands performing 10 repetitions in each direction with hold time of 6-10 seconds in each repetition.

Scapulothoracic muscle activities: The scapulothoracic muscle activities for the muscles that influence scapular alignment, which are linked to neck discomfort, were included of the stabilisation exercise. For the scapulothoracic stabilisation exercise, students learned how to use a thoracic bracing method that combines postural alignment with minimum multifidus muscle activation and scapular rotation. During the workouts, the patients were instructed to maintain their stances and contractions. There were a variety of exercises used, including the scapular adduction and external rotation, bilateral shoulder extension, eccentric scapular contraction, the Brügger's exercise, forward punch, and dynamic embrace. A 200 cm long precut portion of theraband with moderate or medium tension was used by the participants to begin their workouts. A total of ten repetitions were performed, each with a holding period of between six and 10 seconds. They moved on to the next colour of resistive band in the green-to-blue sequence after completing 15 repetitions with no obvious signs of discomfort or weariness [14].

Kinesio Taping

Kinesio Tex Gold FP measuring 5 cm×5 m was used for the study. All participants received a kinesio tape allergy test immediately after the initial assessment. This test consisted of pasting a little piece (1×1 cm) of kinesio tape on forearm volar surface. The findings such as redness or any skin changes would be seen in 15 minutes which is considered positive. The patients who found positive to allergic reaction was instructed to uncover it immediately and therefore were not included in the study [16].

For kinesio tape application, method of brachial plexus application was chosen. The occiput of the skull was used as first reference point and the tape was upto just beyond the farthest distal location of discomfort or paresthesia. The teres minor and major origin insertion points were roughly reached by making a Y cut at the proximal end of the tape. Torn at the base of a Y incision, the paper backing was slid over the insertion site of the teres minor and major roughly 2 inches away. The patient then flexed his shoulder horizontally and rotated his neck to the opposite side of the injury, resulting in shoulder flexion. The upper tail was placed along the upper trapezius to the occiput of the head using very mild to light tension (15-25% of available). It was put along the teres minor and major to the axillary border of the scapula. After that, the patient flexed their wrists and elbows while keeping their shoulders horizontally flexed as instructed. The strip was then placed to the afflicted region with just a little amount of (15-25%) strain. If possible, cut a hole in the centre of the tape right above olecranon process and continue down forearm and dorsal surface of

hand to avoid placing pressure on the olecranon bursa at the elbow. The patient simply has to apply the brachial plexus nerve strip as far down the arm as the radiating discomfort is felt [17].

The pre (at 0 week), mid (at 2 week) and post (at 4 week) measurement of the variables NDI [10], NPRS [11] and Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire [13] were compared.

STATISTICAL ANALYSIS

Data was analysed by using Statistical Package for the Social Sciences (SPSS) version 21.0. Paired t-test was used and p-value <0.05 was set as the level of significance.

RESULTS

Out of 50 subjects who participated, 23 were males (46%) and 27 were females (54%). The mean age of the subjects was 48.1±11.9 years [Table/Fig-1].

Variables	n,%
Age (mean±SD)	48.1±11.9
Males	23 (46%)
Females	27 (54%)

[Table/Fig-1]: Demographic data of the subjects.

Paired t-test was used to analyse the comparison of different values at pre (0 week), mid (2 weeks) and post (4 weeks). The result of the study showed significant difference between all the variables at all the intervals [Table/Fig-2].

Variables	At 0 week	At 2 weeks	At 4 weeks	p-value[1]	p-value[2]	p-value[3]
NDI	46.00± 4.96	30.48± 4.56	14.84± 3.94	0.002	0.022	0.014
DASH	59.52± 7.55	34.49± 8.70	0.74± 0.69	0.002	0.002	<0.001
NPRS	8.72± 0.7	5.10± 1.07	0.74± 0.69	0.001	0.019	<0.01

[Table/Fig-2]: Comparison of mean values of Neck Disability Index (NDI), Numeric Pain Rating Scale (NPRS) and Disability of Arm, Shoulder and Hand questionnaire (DASH).
p-value <0.05 was considered as significant
1-p-value calculated between 0 week and 2 weeks
2-t-value calculated between 2 week and 4 weeks
3-t-value calculated between 0 week and 4 weeks

DISCUSSION

The aim of the research was to observe the efficacy of kinesio taping for brachial plexus as a viable treatment option along with manual therapy and cervical stabilisation for patients with cervical radiculopathy. The results of the study revealed significant differences for all the measured variables showing its efficacy as a treatment method for patients with cervical radiculopathy.

The mechanism thought for relieving pain after the kinesiotape application is through the sensory pathways activation in the nervous system, therefore rising afferent feedback which is predicted to decrease the input coming through nerve fibres which conducts nociception which is due to the gate control theory. Another theory is that application of such types of tape raises the skin which directly decreases pressure over the subcutaneous nociceptors [18]. Patients with meralgesica paraesthetica had less discomfort, better quality of life, and a smaller region of numbness and suffering after eight treatments with kinesio taping, according to a research by Kalichman L et al., [19]. While another study conducted by Nadia A et al., reported that kinesio taping combined with neural mobilisation treatment showed significant improvement in pain, sciatic nerve mobility and functional disability after a treatment program of six sessions in patients with lumbar radiculopathy [16]. Pain relief can consequently decrease disability levels [20]. This helps to explain why the functional impairment in this research has improved so much. Ali MF et al., observed that kinesio taping in conjunction with therapy exercises was useful and had a greater impact on relieving neck discomfort, head posture, and reducing the restriction of function in patients with mechanical neck dysfunction compared to therapeutic exercises alone after one week but no difference was found after six weeks [21].

Celenay ST et al., observed that in patients with mechanical neck discomfort, it was discovered that manual treatment and cervical stability exercises combined were more helpful than stabilisation exercises [14]. Isometric exercises increase the intramuscular coordination by enhancing motor unit activation, synchronisation and/or firing rate within a given muscle. The isometric contraction generates high tension in the muscle than concentric contraction [22]. Neuromuscular control and afferent input caused by mobilisation applications may stimulate neural inhibitory systems at different levels in the spinal cord and activate descending inhibitory pathways from the midbrain to reduce joint stress [14].

In the gate control hypothesis of pain, activation of large-diameter, low-threshold mechanoreceptors may result in inhibition at the spinal cord level, resulting in analgesia. To govern motivational states, the descending neurons produce serotonin and nor adrenaline via activation of the dorsal periaqueductal grey matter [23]. Neck pain reductions have a good effect on functional activity and a decrease in the neck functional disability index [24].

Limitation(s)

The placebo effect was not compared by including sham taping. As the study was of shorter duration, it cannot be said that the improvements can be maintained in long term and whether there were any recurrences of the symptoms. Since multimodal approach of treatment was used, so it is suggested that future studies may investigate the isolated interventions with proven effective methods of treatment.

CONCLUSION(S)

It was concluded that, with addition of kinesio taping along with manual therapy treatment and neck stability exercises, the discomfort was reduced and improvement of functionality of neck and functions of upper limb in patients having cervical radiculopathy were achieved. Therefore, it can be incorporated along with standard treatment in the management of the patients but more clinical trials are needed to establish its effectiveness against other treatment.

REFERENCES

[1] Thoomes EJ. Effectiveness of manual therapy for cervical radiculopathy, a review. Chiropr Man Therap. 2016;24:45.
[2] Gregory G, Mc Kivigan JM. Effectiveness of Intermittent mechanical traction in Cervical radiculopathy: A systemic review. Journal of Medical Research and Practice. 2018;7(2):39-46.
[3] Abdullah GA, Mohamed RA, Sharaf MA. Effect of SNAGS mulligan technique versus low level laser therapy on patients with unilateral cervical radiculopathy. Int J Physiother Res. 2017;5(4):2240-48.
[4] Barot AP, Shukla YU. Effects of neural tissue mobilisation versus intermittent cervical traction in unilateral cervical radiculopathy on pain, range of motion and quality of life- a comparative study. International Journal of Science and Healthcare Research. 2020;5(1):132-42.
[5] Taso M, Sommernes JH, Kolstad F, Sundseth J, Bjorland S, Pripp AH, et al. A randomized controlled trial comparing the effectiveness of surgical and nonsurgical treatment for cervical radiculopathy. BMC Musculoskeletal Disorders. 2020;21(1):01-09.
[6] Childress MA, Becker BA. Non operative management of cervical radiculopathy. American Family Physician. 2016;93(9):746-54.
[7] Elyaspour D, Rayegani SM, Elahi-Movahead M, Sedighi S, Hojjati F. Efficacy of Pneumatic collar versus hard collar on cervical radiculopathy. Physical Medicine, Rehabilitation and Electrodiagnosis. 2019;1(3):136-44.
[8] Ay S, Konak HE, Evcik D, Kibar S. The effectiveness of Kinesiotaping on pain and disability in cervical myofascial pain syndrome. Revista Brasiliera de Reumatologia. 2017;57(2):93-99.
[9] Sheng Y, Duan Z, Qu Q, Chen W, Yu B. Kinesiotaping in treatment of chronic non-specific low back pain: A systemic review and meta-analysis. Journal of Rehabilitation Medicine. 2019;51(10):734-40.
[10] Wainner RS, Fritz JM, Irrgang JJ, Boninger ML, Delitto A, Allison S. Reliability and diagnostic accuracy of the clinical examination and patient self-report measures for cervical radiculopathy. Spine. 2003;28(1):52-62.

[11] Cleland JA, Whitman JA, Fritz JM, Palmer JA. Manual physical therapy, cervical traction and strengthening exercises in patients with cervical radiculopathy: A case Series. J Orthop Sports Phys Ther. 2005;35(12):802-11.
[12] Angela Tao NG, Arora RA. Effectiveness of cervical traction on pain and disability in cervical radiculopathy. Int J Recent Sci Res. 2015;6(4):3609-11.
[13] Langevin P, Desmeules F, Lamothe M, Robittaille S, Roy JS. Comparison of 2 manual therapy and exercise protocols for cervical radiculopathy: A randomized controlled trial evaluating short-term effects. J Orthop Sports Phys Ther. 2015;45(1):04-17.
[14] Celenay ST, Akbayrak T, Kaya DO. A comparison of effects of stabilisation plus manual therapy to those of stabilisation exercises alone in patients with non specific mechanical neck pain: A randomized controlled trial. J Orthop Sports Phys Ther. 2016;46(2):44-55.
[15] Pawaria S, Sudhan DS, Kalra S. Effectiveness of cervical stabilisation exercises on respiratory strength in chronic neck pain patients with forward head posture-a pilot study. J Clin Diagn Res. 2019;13(4):YC06-09.
[16] Nadia A, Mohamed HA, Eslam AT, Ebtessam FG. The effect of Kinesiotape on unilateral Sciatica. The Medical Journal of Cairo University. 2018;86:3419-32.
[17] Kase K, Wallis J, Kase T. Clinical Therapeutic Applications of the Kinesio Taping Method. IInd edition. Pg 71. Kinesio Taping Association International, 2013.
[18] Kothare H, Patil C, Muley R. Immediate effects of kinesiotaping on upper trapezius muscle on subjects having text neck. International Journal of Physiology, Nutrition and Physical Education. 2019;4(2):131-33.
[19] Kalichman L, Vered E, Volchak L. Relieving symptoms of Meralgia paraesthetica using Kinesio taping: A pilot study. Archives of Physical Medicine and Rehabilitation. 2010;91:1137-39.
[20] Bialosky JE, Bishop MD, Price DD, Robinson ME, George SZ. The mechanisms of manual therapy in the treatment of musculoskeletal pain: A comprehensive model. Manual Therapy. 2009;14(5):531-38.
[21] Ali MF, El-wardany SH, Alduraibi SK. Effect of kinesio taping in patients with mechanical neck dysfunction. Med J Cairo Univ. 2015;83:867-73.
[22] Hungund A, Metgud SC, Heggannavar A. Effect of myokinetic stretching technique and spinal mobilisation with arm movement in subjects with cervical radiculopathy: A randomized clinical trial. Indian J Phys Ther Res. 2020;2:134-40.
[23] Maxwell CM, Lauchlan DT, Dall PM. The effects of spinal manipulative therapy on lower limb neuro-dynamic test outcomes in adults: A systematic review. J Man Manip Ther. 2020;28:04-14.
[24] Shaheen AA M, Omar MTA, Vernon H. Cross-cultural adaptation, reliability, and validity of the Arabic version of Neck Disability Index in patients with neck pain. Spine. 2013;38:E609-15.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Feb 10, 2021
- Manual Googling: Aug 05, 2021
- iThenticate Software: Feb 25, 2022 (10%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Feb 09, 2021**
Date of Peer Review: **Mar 18, 2021**
Date of Acceptance: **Aug 06, 2021**
Date of Publishing: **Mar 01, 2022**