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Comparison of the efficacy of kinesiotaping and myofascial release techniques in the treatment of superior cluneal nerve entrapment syndrome: A randomised single blind controlled trial

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Abstract

Background & Objectives: Conservative treatment options are limited in superior cluneal nerve entrapment syndrome, which is one of the causes of low back pain. The aim of this study was to investigate the effect of kinesiotaping and myofascial release technique in superior cluneal nerve entrapment syndrome. *Methods:* Participants were evaluated with Visual Analogue Scale (VAS) for pain, Roland-Morris Disability Questionnaire (RMDQ) and SF-36 before treatment, at the end of treatment and one month after treatment. The first group received kinesiotaping + exercise, the second group received myofascial release technique + exercise, and the control group received only exercise therapy. All groups were given the same exercise program. *Results:* All three groups showed improvements in quality of life and a reduction in pain and disability. Compared to the exercise group, the kinesiotaping and myofascial release groups experienced greater reductions in pain and improvements in quality of life, while the myofascial release group experienced a greater reduction in disability.
Conclusion: Kinesiotaping, myofascial release and exercise are effective treatments for superior cluneal nerve entrapment syndrome.

Keywords: Low back pain, superior cluneal nerve entrapment syndrome, kinesiotaping, myofascial release techniques

INTRODUCTION

A common serious public health problem, low back pain (LBP) can significantly impair a person's functional activity level and lead to serious disabilities.[1] In every age group, LBP is becoming more common.[2] Superior cluneal nerve entrapment neuropathy (SCN-EN) is often overlooked, but may be responsible for up to 14% of cases of low back pain.[3] The superior cluneal nerve (SCN) is derived from the cutaneous branches of the dorsal rami of T11-L4.[4] According to Maigne *et al.* in studies conducted on the report that the SCN is stuck in the osteofibrous tunnel in the space surrounded by the iliac crest and thoraco-lumbar fascia in some cases of low back pain, it was found that the medial branch of the SCN constantly passes through the osteofibrous tunnel and may be stuck in the tunnel on its own.[5-7] As a complication of bone grafting from the posterior iliac crest, it may cause injury to the SCN branches and cause chronic LBP.[8] The SCN is a purely sensory nerve originating from the lower thoracic and lumbar posterior nerves. It can be entrapped near the iliac crest where it penetrates the thoracolumbar fascia or as it passes through the osteofibrous tunnel formed by the thoracolumbar fascia and the superior edge of the iliac crest, causing low back and leg pain and is often misdiagnosed as other lumbar spinal disorders.[9] Injection therapy, alcohol neurolysis, peripheral nerve stimulation and surgical treatments have been described in the treatment of superior cuneal nerve entrapment.[10]

Kinesiotaping and myofascial release

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techniques have been widely used in the treatment of musculoskeletal disorders and many studies have been conducted on their effectiveness. Kinesiotaping is a method that aims to support nerve and muscle structures, increase proprioceptive feedback and reduce local inflammation through elastic bands applied to the skin.[11] In particular, the effect of kinesiotaping on pain and functional improvement in the management of symptoms related to nerve compression has attracted attention.[12]

Myofascial release is a manual therapy method that aims to reduce muscle tone and release fascia tensions by targeting the muscle-fascia relationship.[13] The use of these techniques in SCN-EN may show promising results in the management of pain due to nerve compression. The aim of this study was to investigate the effect of kinesiotaping and myofascial release technique in superior cluneal nerve entrapment syndrome.

METHODS

Design: The study was designed as a single-blind randomised controlled trial. Ethics committee approval was obtained for the study. Written informed consent was obtained from the participants.

Participants: The study included 90 patients diagnosed with superior cluneal nerve entrapment syndrome by lidocaine injection. Patients under 18 years of age, those with communication problems and those who also described pain in the mid-lumbar region were excluded. Participants were divided into three equal groups by block randomisation method (Figure 1).

Evaluation parameters

Participants were assessed for pain using the Visual Analogue Scale (VAS), Roland-Morris

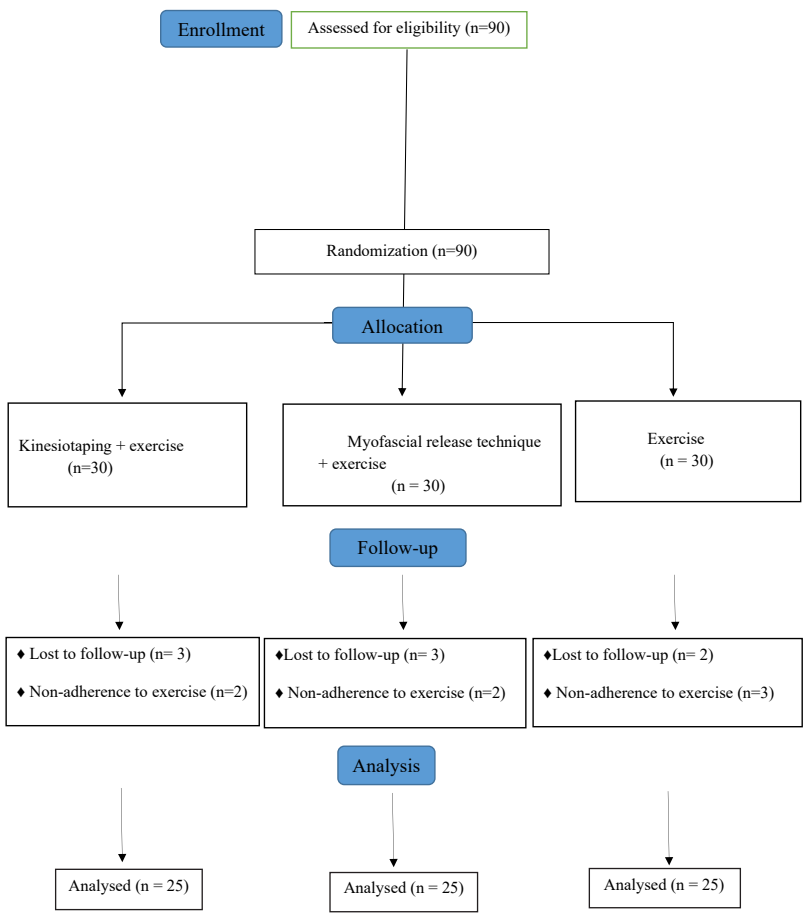

Figure 1: CONSORT flow diagram of the study

Disability Questionnaire (RMDQ) and SF-36 by the same researcher (RY) who was blinded to the treatment groups before treatment, at the end of treatment and one month after treatment.

Visual Analoque Scale is a scale consisting of a single 10 cm line and assesses the intensity of pain. Patients were asked to rate the level of pain after being informed that the beginning point on the scale represented no pain and the end point represented the most excruciating pain they had ever experienced.[14]

The *Roland-Morris Disability Questionnaire* is a questionnaire developed to assess functional disabilities in patients with low back pain.[15] In the questionnaire consisting of 24 sentences about functional disabilities, patients are asked to answer each sentence as yes if it fits their situation and no if it does not. Yes answers are calculated as '1' and no answers as '0' points, resulting in a total score between 0-24, with a higher score indicating more disability.

SF-36 Quality of Life Scale is a general quality of life scale frequently used in clinical research. The scale consists of 36 items, which measure 8 different dimensions: physical functions, social functions, role inhibition due to physical problems, physical pain, mental health, role inhibition due to emotional problems, life energy, general health perception. The subscales assess health on a scale of 0 to 100, with higher scores indicating good health quality.

Interventions

The first group received kinesiotaping + exercise, the second group received myofascial release technique + exercise, and the control group received only exercise therapy. All groups were given the same exercise program and advised to keep an exercise diary.

Kinesiotaping was performed by the same researcher (FÇA) for two sessions per week for four weeks with fascia correction technique. The procedure was performed with the participant lying in the prone position. The tape was glued just below the beginning of the iliac crista without stretching. Submaximal tension was continued on the skin in line with the lower fibres of the quadratus lumborum muscle and thorocolumbar fascia. It was terminated without tension at the lower costal fold. I band was applied perpendicular to the line of insertion of the quadratus lumborum and thorocolumbar fascia to the crista iliaca with 50% tension in the middle section without tension at the beginning and end.

Myofascial release technique was applied by the same researcher (İÇK) twice a week for four weeks. Ischaemic compression was applied to palpable trigger points on the quadratus lumborum muscle. One hand was placed on the inferior crista iliaca and the other hand on the superior inferior costal fold and waited for 3 minutes with minimal tension. The hand was made into a fist and minimal pressure was applied with the proximal phalanges over the quadratus lumborum and the participant was asked to contract and release the muscle for 3 minutes.

Lumbar muscles (especially quadratus lumborum) and thoracolumbar fascia stretching exercises and strengthening exercises for the lumbar and abdominal muscles were described by the physiotherapist. Participants were asked to perform the exercises three times a day, five days a week. All participants received an exercise diary.

The G*Power 3.1.9.4 software package was used to calculate the sample size. The sample size was calculated using a one-way ANOVA test to determine whether there was a difference in pain intensity and disability scores between treatment methods (kinesiotaping + exercise, myofascial release technique + exercise, exercise). To obtain statistically significant results from this study, it was determined that a total of 66 patients across three groups should be included in the study, provided that each group had at least 22 patients, with an effect size of 0.40 (Cohen's f = 0.40), a probability of error of 0.05, and a study power of 0.90.

Statistical analysis

SPSS 26.0 software (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY, ABD: IBM Corp.) was utilized for statistical analysis of the data collected. The Shapiro-Wilk test was used for the normality test. Normally distributed measurement data are presented as mean ± standard deviation (± SD) and non-normally distributed data are presented as median (min max). One way anova with Benferroni correction was used for comparison between groups and two way anova repeated measures with Benferroni correction was used for repeated measures.

RESULTS

A total of 75 participants completed the study. Three participants from the kinesiotaping group, three participants from the myofascial release group and two participants from the exercise group did not attend the follow-ups, and two participants from the kinesiotaping group, two participants from the myofascial release group and three participants from the exercise group were excluded from the study due to exercise non-compliance. There were no significant demographic differences between the groups (Table 1).

All three groups showed improvements in quality of life and a reduction in pain and disability. Compared to the exercise group, the kinesiotaping and myofascial release groups experienced greater reductions in pain and improvements in quality of life, while the myofascial release group experienced a greater reduction in disability (Table 2). No side effects were observed.

DISCUSSION

The present study has demonstrated that kinesiotaping, myofascial release techniques and exercise treatments are effective in reducing pain and disability and improving quality of life in patients with superior cluneal nerve entrapment syndrome. Additionally, it was determined that myofascial release techniques were more efficacious than exercise therapy in reducing disability. Furthermore, kinesiotaping and myofascial release techniques were more efficacious than exercise therapy in reducing pain and improving quality of life.

The limited number of studies on the treatment of SCN-EN, the importance of which has been recently acknowledged in the context of low back pain, have concentrated on the use of injections, neurolysis and surgical treatments. There is a lack of alternative conservative treatment options for patients who are not suitable for or do not prefer these treatments, which represents a significant unmet clinical need.

The fascia may become taut as a result of injury or repetitive strain, which can subsequently impede the flexibility of the muscles . Such tightness may result in pressure being applied to the nerves, which could in turn lead to a restriction of movement.[16] Myofascial release employs manual pressure and stretching techniques on muscle tissue and fascia, thereby reducing the tension of these tissues. Manual relaxation techniques increase the flexibility of the fascia and facilitate muscle and joint movement.[17] This contributes to relieving pressure on the nerve and reducing pain. The application of light pressure to the skin and subcutaneous tissues stimulates the receptors responsible for proprioception.[18] This stimulus can regulate muscle tone via the central nervous system and reflexively cause the muscles to relax. Reduced pressure on the nerve endings can help relieve possible compression of nerve conduction.[19] For carpal tunnel syndrome and piriformis syndrome caused by compression of the peripheral nerve, the effectiveness of the myofascial release technique has been demonstrated.[20-22] The present study demonstrates the efficacy of myofascial release in the management of pain, disability and quality of life in patients with superior cluneal nerve entrapment syndrome. This finding may indicate that myofascial release represents a valuable therapeutic option for the treatment of superior cluneal nerve entrapment syndrome.

It has been documented that kinesiotaping has the capacity to facilitate the treatment of pathologies affecting the central and peripheral nervous systems.[23,24] Kinesiotaping reduces inflammation and promotes a healing environment by increasing blood and lymph circulation.[25]

Table 1: Demographic characteristics of the participants

	Kinezyotaping + exercise group (n=25) $\bar{x}$ ±sd	**MFR + exercise group (n=25) $\bar{x}$ ±sd**	**Exercise group (n=25) $\bar{x}$ ±sd**	**F**	**p**
Age	48.24 ±14.23	45.8±13.1	49.76±14.29	0.57	0.566
BMI	28.11 ±4.28	27.19±5.01	26.72±3.41	3.81	0.089
Sex % Female	80.4	79.13	78.19	2.72	0.397
Disease duration (month)	10.26±4.39	11.01±7.69	10.13±5.97	2.14	0.097

MFR: Myofascial Release, $\bar{x}$: mean, sd: Standard deviation, One-way ANOVA test, BMI: Body mass index

Table 2: In-group and between-group comparisons of pain, disability and quality of life parameters

		(A) Kinezyotaping + exercise group (n=25)		(B) MFR + exercise group (n=25)		(C) Exercise group (n=25)		Between-group analysis Significant Difference
		$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	
VAS	1. Baseline	7.28	0.29	6.12	0.31	5.44	0.26	A-C;B-C; (**p**=0.008**)
	2. After Treatment	4.24	0.4	5.12	0.29	3.56	0.32	
	3. Control	3.92	0.51	3.68	0.29	2.8	0.33	
	sd	2		2		2		
	F	29.74		38.83		105.6		
	p*	**.000**		**.000**		**.000**		
Within Group	**Significant Difference**	1-2, 1-3		1-2, 1-3, 2-3		1-2,1-3,2-3		
RMDI	1. Baseline	12	1.04	16.84	1.04	12.88	1.04	B-C (**p**=0.013**)
	2. After Treatment	10.6	1.02	10.2	1.18	7.48	0.81	
	3. Control	8.32	0.96	9.8	1.36	4.64	0.42	
	sd	2		2		2		
	F	107.58		132.2		121.43		
	p*	**.000**		**.000**		**.000**		
Within Group	**Significant Difference**	1-2, 1-3,2-3		1-2, 1-3		1-2,1-3,2-3		
SF Mental Component	1. Baseline	47.52	3.46	48.33	3.94	45.15	3.77	B-C (**p**=0.011**)
	2. After Treatment	55.26	2.87	67.96	3.27	54.19	3.97	
	3. Control	63.54	3.58	77.53	2.97	54.85	4.98	
	sd	2		2		2		
	F	338.29		633.71		199.89		
	p*	**.000**		**.000**		.079		
Within Group	**Significant Difference**	2-1, 3-1,3-2		3-1,3-2,2-1				
SF Physical Component	1. Baseline	45.65	3.72	42.77	3.1	36.47	3.27	A-C; B-C (**p**=0.001**)
	2. After Treatment	55.87	3.76	65.77	3.02	46.93	3.71	
	3. Control	65.85	3.85	78.05	3.5	49.4	4.77	
	sd	2		2		2		
	F	263.47		528.34		170.32		
	p*	**.000**		**.000**		**.000**		
Within Group	**Significant Difference**	3-1, 3-2, 2-1		3-1,3-2,2-1		3-1, 2-1		

MFR: Myofascial Release , $\bar{x}$: mean, SE:Standard Eror, sd: Standard deviation, *: one way anova repeated measures with Benferroni correction, **: two way anova repeated measures with Benferroni correction, VAS: Visual analog scale, RMDI: Roland-Morris Disability Questionnaire, SF: Short Form-36,

No side effects were observed.

Depending on the purpose of the application, kinesiotaping can be used in different shapes and techniques. The muscle inhibition technique is used in clinical practice to prevent excessive contraction in damaged or overused muscles.[26] It is asserted that the area correction technique can assist in the alleviation of pain by elevating the skin, fascia and soft tissue in the vicinity of the affected area, exploiting the elastic properties of the band. In this method, the pressure below the applied field and on the chemical receptors and nociceptors is reduced, and lymphatic drainage and blood circulation are enhanced, thereby facilitating the removal of exudates.[27] The efficacy of Kinesiotaping in the treatment of various neuropathies has been demonstrated in clinical studies. These include carpal tunnel syndrome, thoracic outlet syndrome, and superficial radial nerve compression syndrome, which are conditions in which the nerve is compressed by muscle, fascia, or tendon.[28-30] The present study demonstrated that kinesiotaping is an effective treatment for superior cluneal nerve compression syndrome, consistent with the findings for those nerve compression syndromes. Kinesiotaping may be considered as a conservative treatment method for superior cluneal nerve entrapment syndrome.

It is important to consider the limitations of the study when interpreting the data. The most crucial of these is the brief follow-up period. The relatively small number of participants and the absence of ultrasound imaging in the diagnostic process represent additional limitations. Furthermore, the evaluation parameters used are subjective, as they are based on the participants' own responses. The importance of the study is that it offers treatment alternatives in a situation where conservative treatment methods are limited.

In conclusion, kinesiotaping, myofascial release and exercise are effective treatments for superior cluneal nerve entrapment syndrome.

DISCLOSURE

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Conflict of interest: None

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