

A Study to Compare Phonophoresis with Kinesio Taping in Reducing Pain and Improving Grip Strength in Subjects with Tennis Elbow

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ABSTRACT

Background: Taping techniques are advocated for musculoskeletal conditions such as Tennis elbow, a prevalent disorder with a significant impact on the individual and community. Little evidence exists supporting the effects of taping techniques on musculoskeletal pain. Therefore, the study aims to determine the effectiveness of a taping technique on pain and grip strength in subjects with tennis elbow.

Method: 30 subjects were taken into the study and divided into 2 groups of 15 in each group. Group A subjects were treated with phonophoresis with sodium diclofenac gel of 2% for 5-8 minutes for 6 weeks. Group B patients were treated with Kinesio taping for 6 weeks. Before and after treatment, pain was measured using a Visual analogue scale, and grip strength was measured with a modified sphygmomanometer.

Result: This study revealed a significant difference between the phonophoresis (Group A) and kinesiotaping (Group B) treatments. Although in both the groups, there was a reduction in pain and improvement in grip strength, significant improvement was seen in Group B subjects treated with kinesiotaping where the p-value is <0.0001 shows extremely significant improvement in Group B in reducing pain and improving grip strength when compared to Group A.

Conclusion: Although the study showed beneficial results in both groups, the results reflected that the kinesiotaping group (Group B) had better improvement than the other phonophoresis group (Group A) measured in pain and grip strength in patients with tennis elbow.

Keywords: Tennis Elbow, VAS, Phonophoresis, Taping, Physiotherapy.

INTRODUCTION

The elbow is the inconspicuous part of the body, that we rarely notice it, unless it hurts. Pain at the elbow is often caused by, injuries to the tendons. Sometimes a muscle injury

may cause the pain to extend down the forearm. There are other structures surrounding the elbow, that can become strained or inflamed, but muscles and tendons cause the most troubling problems.

Pain around the lateral epicondyle is known by a variety of names and was described as periostitis, extensor carpi radialis brevis-tendinosis and epicondylalgia. The commonly used name is “Tennis elbow” and “Lateral epicondylitis”^{1,2}. Tennis elbow is a debilitating and painful musculoskeletal condition, which poses significant challenges to the healthcare field. The younger age has a sports-related injury. The older one has epicondylitis due to work-related injury or overuse syndrome^{3,4}.

- Peak prevalence of lateral epicondylitis is between 30-60 years of age.
- The prevalence in the general population is approximately 1.0-1.3% in men and 1.1-4.0% in women^{5,6,7}.

Lateral epicondylitis is a relatively common condition that can affect persons who perform repetitive upper body activities such as carpenters, musicians, tennis players and computer programmers. Lateral epicondylitis involves the proximal tendons of the extensor carpi radialis and extensor digitorum. These tendons are relatively hypovascular proximal to the tendon insertion. The hypovascularity may predispose the tendon to hypoxic tendon degeneration and has been implicated in the etiology of tendinopathies most typically, the primary pathology in tendinosis of the extensor carpi radialis brevis tendon 1-2cm distal to its attachment on lateral epicondyle.

The primary concerns reported are discomfort and diminished grip strength. The diagnosis is straightforward and can be validated through tests that elicit pain, including:

- Palpation of the lateral epicondyle facet
- Resisted extension of the wrist
- Resisted extension of the middle finger and passive flexion of the wrist^{8,9}.

Symptoms are often aggravated with activities that involve gripping actions including

- Shaking hands
- Holding any tools
- Lifting a kettle

Histological studies suggest that lateral epicondylalgia involves a degenerative process, citing the presence of disorganized collagen as opposed to inflammatory cells. Henceforth, the term epicondylitis is not an accurate descriptor of the disorder, suggesting the use of the most generalized term like Epicondylagia^{10,11}.

LOW-LEVEL LASER THERAPY acts in a dose-dependent manner by biological mechanisms including the biostimulatory effect on collagen production which modulates both tendon inflammation and tendon repair process. There is also evidence to support the use of ULTRASOUND THERAPY in treating lateral epicondylitis^{12,13}. MANUAL THERAPY and MASSAGE have shown favourable initial responses, in terms of pain-free grip strength and maximum grip strength. Biomechanical studies have shown that forearm bracing has a direct effect on reducing stresses on the origin of extensor carpi radialis brevis. It is claimed that eccentric training results in tendon strengthening, stimulating mechano receptors in tenocytes to produce collagen, which is probably the key cellular mechanism that determines recovery from tendon injury^{14,15}.

Phonophoresis, commonly referred to as sonophoresis, is posited to augment the transdermal delivery of specific pharmacological compounds, including anti-inflammatory steroids and local anaesthetics, from unbroken skin into the deeper subcutaneous tissues via ultrasound, thereby enhancing their therapeutic efficacy. This technique typically employs an ultrasound device that operates at frequencies ranging from 0.7 to 1.1 MHz. The ultrasound power levels applied generally fall between 0.0 and 3.0 Watts per cm². Both continuous and pulsed modes of application have been utilized, with the majority of sessions lasting between 5 and 8 minutes, and it is anticipated that treatments targeting larger areas (exceeding 36 cm²) will necessitate durations extending beyond 8 minutes^{16,17}. Phonophoresis is the

movement of drugs through the skin into the subcutaneous tissues under the influence of ultrasound. Many drugs are absorbed through the skin very slowly; high-frequency sonic vibration may accelerate this process^{18,19}.

The Kinesio tape was first designed by Dr. Kenzo Kase in 1973 in Japan. He believed that kinesio tape techniques like sports tapes and straps-which help support the muscle and joint-can decrease the motion range and cannot support fascia and in some cases, these techniques will restrain the improvement process of affected tissues. Therefore, he decided to produce the kinesiology tape with different principles and methods. In this tape, a specifically designed tape is used which can be stretched up to 40% and contrary to the previous tape, they allow the full range of motion to the body^{20,21}. Kinesio-taping (KT) method is being used as both a therapeutic and performance-enhancement tool.

Kenzo Kase asserted that it facilitates:

1. The collection of fascia to orient the tissue in its preferred alignment.
2. The elevation of the skin above areas characterized by inflammation, discomfort, and swelling.
3. An enhancement of mechanoreceptor stimulation to either promote or restrict movement.
4. The delivery of a positional stimulus to the epidermis.
5. A reduction of pressure on the lymphatic pathways that serve as a conduit for the elimination of exudates^{22,23}.

The main purpose of this current study is to compare the effectiveness of phonophoresis with kinesiotaping in reducing pain and improving grip strength in subjects with Tennis elbow.

MATERIALS & METHODS

- Study Design: Experimental study design
- Sampling Method: Simple random sampling
- Place Of Study: OPD SIMS College of Physiotherapy

- SAMPLING CALCULATION: 30 (15 in each group)

- STUDY POPULATION: Subjects with PA shoulder.

- STUDY DURATION: 6 weeks

a. INCLUSION CRITERIA:

Subjects are selected for the study if they fulfil the following criteria.

- a. Age: 18-30 years.

- b. Provocation of the lateral elbow pain with at least one of the following tests-

- i. Resisted middle finger extension

- ii. Resisted wrist extension (or) passive stretch of wrist extensors.

b. EXCLUSION CRITERIA:

- Cervical spondylosis

- Diabetes mellitus

- Neuropathy

- Arthritis in the upper extremity

- Pregnancy

- History of surgery

- Acute trauma in the elbow.

OUTCOME MEASURES

- Pain was measured using the VAS scale.

- Grip strength was measured using a modified sphygmomanometer.

PROCEDURE

The subjects were given taping and phonophoresis as per the following procedures.

KINESIO TAPING

The patient's elbow is shaved twelve hours before taping. The skin is cleaned and dried, removing any grease or sweat. Kinesiotape is applied to provide excellent comfort and for immobilization.

The patient is asked to sit comfortably. Stretch the forearm with the palm facing down and anchor a "Y" strip on the back of the wrist. With the arm extended and the wrist fully bent downwards. Apply both legs of the strip apart along the muscle line a little over the elbow. But both ends of the legs to meet at the tip.

PHONOPHORESIS

The nature of treatment is explained to the patient. The patient is asked to sit in the chair with the involved arm abducted and elbow flexed resting on a pillow. Sodium diclofenac is used as a copulant and applied to the skin. The treatment head is placed on the skin before the output is turned on, to avoid damage to the transducer. The treatment head is moved continuously over the surface while even pressure is maintained to iron out the irregularities in the sonic field. The rate of movement is maintained slow enough to allow the tissues to deform. The intensity was turned to zero

before the transducer is removed from the tissue contact.

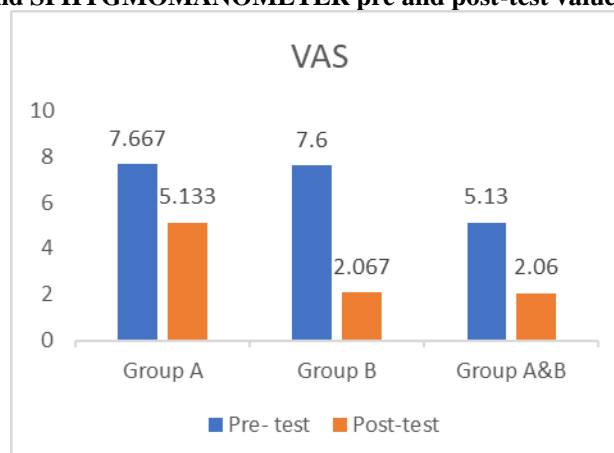
RESULT

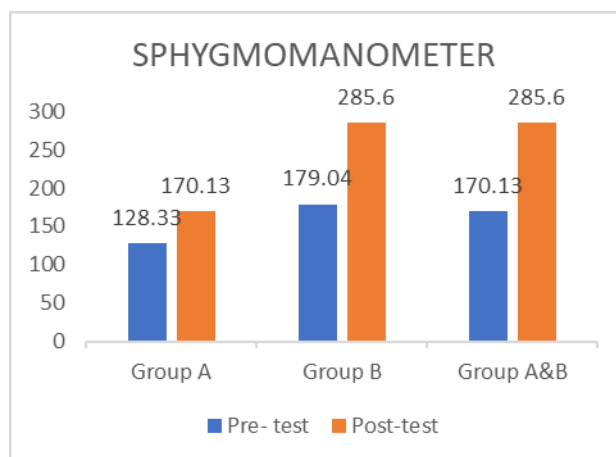
This study's results revealed a significant difference between the phonophoresis (Group A) and kinesiio taping (Group B) treatments. Although in both the groups, there was a reduction in pain and improvement in grip strength, significant improvement was seen in Group B subjects treated with kinesiio taping where the p-value is <0.0001 shows extremely significant improvement in Group B in reducing pain and improving grip strength when compared to Group A.

TEST	MEAN	SD	T VALUE	P VALUE
VAS				
Group A				
Pre-test	7.667	0.9759	7.644	<0.0001
Post-test	5.133	0.8338		
Group B				
Pre-test	7.600	1.056	16.892	<0.0001
Post-test	2.067	0.7037		
Group A&B				
Post A-test	5.13	0.8338	10.886	<0.0001
Post B-test	2.06	0.7037		
SPHYGMOMANOMETER				
Group A				
Pre-test	128.33	11.617	6.610	<0.0001
Post-test	170.13	21.563		
Group B				
Pre-test	179.04	34.255	11.004	<0.0001
Post-test	285.6	10.998		
Group A&B				
Post A-test	170.13	21.563		<0.0001
Post B-test	285.6	10.998		

Table: VAS and SPHYGMOMANOMETER pre and post-test values of Group A&B.

Graph: VAS and SPHYGMOMANOMETER pre and post-test values of Group A&B.





DISCUSSION

The data of this study demonstrated that the technique of Kinesio tape improved pain-free grip strength in subjects with tennis elbow. A possible clinical ramification of this finding is that Kinesio tape could be used, to facilitate pain-free grip implementation of daily activities in tennis elbow.

Dr. Kenzo Kase's taping method addresses various therapeutic goals: it enhances muscle function by supporting weak muscles, promotes blood and lymphatic circulation by reducing tissue fluid or bleeding under the skin, alleviates pain through neurological mechanisms, realigns subluxated joints by easing abnormal muscle tension, restores the functionality of fascia and muscles, and improves proprioception by stimulating skin mechanoreceptors^{24,25}.

There are different techniques of kinesiotope. It may have a facilitator or inhibitory effect on muscles depending on the technique which was used. In the present study, kinesiotope was applied from origin to insertion via muscle technique. It was found that the hand grip strength of the subjects was improved after treatment. Also, no side effects were observed after application. The kinesiotope technique seemed to be effective in increasing the hand grip strength of healthy individuals and the best region for tape application was the extensor region of the forearm²⁶. The tactile input provided by the Kinesio tape has been reported to interact with the motor

cortex by altering the excitability of the central nervous system²⁷.

Phonophoresis involves the delivery of drugs through the skin into subcutaneous tissues using ultrasound. While many medications are typically absorbed slowly through the skin, high-frequency sound waves can enhance this absorption. For instance, the application of a topical 2% diclofenac in a pleuronic lecithin liposomal organo-gel has shown promising results in providing short-term relief from elbow pain and wrist extensor weakness linked to chronic lateral epicondylitis. This technique offers a safe, painless, and convenient method for administering medications to deeper tissues within the body^{28,29}.

CONCLUSION

The preliminary study demonstrated an ameliorative effect of a kinesiotope technique on pain-free grip strength in individuals with tennis elbow. The data suggest that this treatment technique may be a useful adjunct in the management of this condition, optimising the imposed loads on the forearm muscles during exercise and functional rehabilitation.

Abbreviations

KT- Kinesio taping

VAS- Visual analogue scale

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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