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Influence of kinesio Tape in Treating Carpal Tunnel Syndrome

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Abstract

Carpal tunnel syndrome (CTS) is one of the most common entrapment neuropathies in the upper limb, causing sensory and motor disturbances in the hand. Objectives: This study has been done to investigate the effect of kinesio tape on altering pain level in patient with CTS. Methods: Sixty CTS patients (43 females and 17 males) with the mean age of (40.2) years were assigned randomly into two equal groups. Group A received traditional physical therapy program (strengthening and stretching exercises for wrist muscles and ligaments) with kinesio tape for 4 weeks, Group B received traditional treatment as group A only. Visual analogue scale, MSDL, MMDL, MMCV and MSCV by electromyography were measured pre and post treatment. Results: The results of the study showed that there was significant decrease in pain level, MSDL and MMDL in group A. conclusion: This study showed the feasibility, safety and cheapness of the kinesio tape as treating tool in CTS patients.

***Key words*:** Carpal tunnel syndrome, kinesio tape, Electrodiagnosis, Pain.

Introduction

Carpal tunnel syndrome is the most common peripheral nerve entrapment syndrome in the upper limbs. It is one of the most commonly treated compression neuropathy of the whole body, it is considered an extremely disabling repetitive stress injury that results in pain, inflammation and altered neurological function in the distribution of median nerve [(1).]

Increased pressure of carpal tunnel may be result from biomechanical factors. It is accepted that exposure to hand-arm vibrations, exposure to a combination of repetitive hand use and the use of hand force may be causal agents. Also, it may be concerned as an occupational disease as, in recent years expanding use of computer could be a risk factor for development of C.T.S [(2).]

There is a normal movement relationship in the carpal tunnel between the median nerve and the flexors tendons. It is thought that chronic repetitive use of the fingers and wrist may create a shearing between these structures, resulting in localized hyperplasia and fibrosis of the investing tenosynovities of the flexor tendons and the median nerve in the tunnel. Adhesions between the median nerve and surrounding structures especially the flexors tendons result in stretching the nerve [(3).]

Compression of the median nerve may be caused by narrowing of the lumen of the tunnel, reducing its dimensions and increasing in its contents. This leads to impaired median nerve conduction, paraesthesia, and pain in the area of median nerve distribution in the hand. In severe cases, it can lead to focal demyelination,

which may result in more constant or severe symptoms, such as weakness and wasting of the thenar muscles in the affected hand [4].

Most cases of CTS are of unknown causes, or idiopathic. Carpal Tunnel Syndrome, there is a community prevalence of between 1.3 and 4.9% of general population. CTS is commonest in people between the ages of 45 - 65 and common in women more than men (3:1), dominant more than non dominant hand , and affecting white races more than black ones [5,6].

The most typical symptoms of CTS are pain and paresthesia occurring especially at night in the region of the median nerve in the hands. It is very common for patients with CTS to wake up with hypoesthesia, feel paresthesia while reading and obtain relief of symptoms by shaking hands [7].

Many approaches were reported for the treatment of CTS. They included conservative and surgical intervention. Conservative treatment includes the use of medications, injection of non- steroidal anti-inflammatory drugs [8]. Carpal bone mobilization [9], passive stretching of the transverse carpal ligament, ultrasound therapy [10], and low intensity laser therapy [11], surgical procedures included the division of transverse carpal ligament endoscopically or with open incision in order to decompress the median nerve, but it was found that within two years of surgery, 75% of patients showed recurrence of pain symptoms [12].

Kinesio Tape is employed as a gentle stretching therapy for many soft tissue disorders and repetitive strain injuries. This remarkable therapy works by reshaping soft tissue, increasing flexibility, enabling lymphatic fluid exchange reducing swelling and enhancing circulation. Properly applied, it helps the body get back to its natural healing process after an injury **[4].**

Kinesio Tape enables people suffering from CTS to access the expert natural stretching therapy consistently and cost effectively with no downtime in the convenience and comfort of home. It offers relief from wrist pain, hand numbness and finger tingling of CTS in days. It is different from other over-the-counter Carpal Tunnel treatments that it is not a rigid wrist brace for immobilization **[6].**

Material and Methods

Subjects

This study was approved by the Ethical Committee of the Faculty of Physical Therapy, Cairo University. Procedures were explained and informed consent was obtained from eligible participants. Pre-post test design was used in this study. Sixty patients were recruited from the outpatient clinic of the neurology department, faculty of Physical Therapy diagnosed as carpal tunnel syndrome. Both genders (43 females and 17 males) were included in the study, with age ranged from 30 to 50 years (mean age was 40.2years), the mean weight was 75.64 kg, and the mean height was 165 cm. They were randomly assigned into equal two groups. Cases were selected and treated but the dominant hand only was enrolled in the study. Patients had complaints for at least three months, before starting the treatment, all patients had positive Phalen test and Tinel's sign and all patients had positive electrodiagnostic findings: prolonged median sensory distal latency MSDL and decreased median sensory conduction velocity MSCV.

Any patients had atrophy of the thenar muscles or prolonged motor distal latency, previous carpal tunnel release, Recent trauma of the wrist or median nerve, Anatomical abnormalities of the wrist or hand, history of steroid injection into the carpal tunnel or some diseases like cervical radiculopathy, polyneuropathy, Raynaud's disease, diabetes mellitus, thyroid disease or rheumatoid arthritis were excluded from the study.

Instrumentations

Computerized electromyography:

Tonnies neuroscreen plus version 1.59 was used for the measurement of the nerve conduction studies (SDL, MDL, SCV and MCV) before treatment and after 4 weeks of the treatment for all patients.

Procedures

Assessment procedure:

1-Median nerve sensory and motor fibers distal latency tests fig 1, 2 were conducted before the study and after 4 weeks of the treatment

Fig (1): Measurement of median motor distal latency

Fig. (2): Measurement of median sensory distal latency(Antidromic)

2-Visual analogue scale (VAS)

It was used to measure the intensity of pain pre and post treatment.

Treatment procdure:Group (A) Consisted of 30 patients received traditional treatment (strengthening and stretching exercises for wrist muscles and ligaments) three times per week for every other day and kinesio tape application for four weeks fig 3.

Fig.(3):Wrist kinesio tape for CTS

Group (B) Consisted of 30 patients received strengthening and stretching exercises for wrist muscles and ligaments only three times per week for every other day for four weeks.

Results

Assessment of Pain level

Table 1: demonstrated pain level using VAS pre and post treatment for groups (A) & (B). There was a significant difference in the paired t-test between pre and post treatment pain level values

Assessment of motor distal latency

Table 2: demonstrated Motor Distal Latency pre and post treatment for groups (A) & (B). There was a significant difference in the paired t-test between pre and post treatment Motor Distal Latency values

Assessment of Sensory Distal Latency

Table 3 demonstrated Sensory Distal Latency pre and post treatment for groups (A) & (B). There was a significant difference in the paired t-test between pre and post treatment Sensory Distal Latency values.

Table (1): Mean and ±SD, t and P values of Pain Level pre and post treatment of groups (A) & (B).

Group A	Pain Level		Group B	Pain Level	
	Pre treatment	Post treatment		Pre treatment	Post treatment
Mean	7.07	1.87	Mean	7.13	6.87
± SD	±1.16	±0.99	± SD	±0.83	± 0.92
t-value	15.26		t-value	1. 3	
P-value	0.0001		P-value	0.22	
S	S		S	NS	

***SD: standard deviation, P: probability, S: significance, NS: Non-significance**

Table (2): Mean and ±SD, t and P values of Motor Distal Latency pre and post treatment of groups (A) & (B).

Group A	Motor Distal Latency		Group B	Motor Distal Latency	
	Pre treatment	Post treatment		Pre treatment	Post treatment
Mean	4.41	3.9	Mean	4.51	4.34
± SD	±0.47	±0.32	± SD	±0.61	± 0.51
t-value	7. 21		t-value	1.07	
P-value	0.003		P-value	0.30	
S	S		S	NS	

***SD: standard deviation, P: probability, S: significance, NS: Non-significance.**

Table (3): Mean and ±SD , t and P values of Sensory Distal Latency pre and post treatment of groups (A) & (B).

Group A	Sensory Distal Latency		Group B	Sensory Distal Latency	
	Pre treatment	Post treatment		Pre treatment	Post treatment
Mean	3.87	2.91	Mean	3.93	3.74
± SD	0.61±	0.21±	± SD	0.31±	± 0.37
t-value	11.22		t-value	0.58	
P-value	0.0001		P-value	0.55	
S	S		S	NS	

***SD: standard deviation, P: probability, S: significance, NS: Non- significance.**

Discussion

Entrapment of the median nerve at the wrist is the most common cause of sensory and motor disturbance in the hands and can be progressively disabling. Numbness, tingling, and burning within the median nerve innervated area of the hand are the most common symptoms, as well as nocturnal pain and ultimately muscle weakness [(13).]

This study was conducted to investigate the effect of kinesio tape on altering pain level, motor, and sensory distal latencies of median nerve in patients with carpal tunnel syndrome.

Sixty patients were assessed for pain intensity by VAS and for sensory and motor distal latencies by measuring nerve conduction velocity using electromyography device. These measures were recorded for both groups at two times, before starting the study (pre treatment) and after 4 weeks from initial assessment (post treatment).

At the beginning of this study, there was no significance difference in the mean values of the pre-treatment measurement of pain level, sensory distal latency, motor distal latency which indicated the evidence of homogeneity among all patient in the both groups included in the study. After the application of the treatment there were a significant decrease in pain level and sensory and motor distal latencies in both groups with high significance in group A when compared to group B.

Kineso tape have several benefits depending on the amount of stretch applied to the tape during application including, provide a positional stimulus through the skin, to align fascial tissues, to create more space by lifting fascia and soft tissue above area of pain/inflammation, to provide sensory stimulation, to assist or limit motion and to assist in the removal of edema by direct exudates toward a lymph duct [(14)].

It is theorized to have several functions as, restoring correct muscle function, reducing congestion by improving the flow of blood and lymphatic fluid, decreasing pain by stimulating neurological system, correcting misaligned joints and provides immediate sensorimotor feedback regarding functional abilities[(15).]

It was suggested that pain relief via application of kinesio tape due to pain modulation via the gate control theory [(16)] because it has been proposed that tape stimulates neuromuscular pathways via increased afferent feedback throughout increase mechanical receptors discharge to spinal cord so block pain [(17).]

Conclusion

From the previous obtained results of our study, we can conclude that Kinesio taping accompanied with nerve and tendon gliding exercises were very effective in treating CTS

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