



## EFFECT OF KINESIO TAPING ON PAIN AND GRIP STRENGTH IN VIDEO GAME PLAYERS WITH GAMER'S THUMB

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### ABSTRACT

**Objective:** The present study aims at studying the effectiveness of Kinesio tape in video game players with gamers thumb by comparing the pre and post (48 hours) pain score and grip strength.

**Background:** Dequervain's disease also known as Gamer's thumb is thought to be due to thickening of synovial sheath containing the extensor pollicis brevis and abductor pollicislongus tendons. This causes pain and swelling over radial side of wrist accompanied by increased difficulty in gripping objects. Kinesio taping has been commonly used in orthopedic and sports settings and gradually becoming an adjunct treatment option for other musculoskeletal impairments.

**Methodology:** 30 video game players were selected. Kinesio taping was done using 3 pieces of kinesio tape. Pain intensity was evaluated using Numerical Rating Scale while the hand grip strength using Jamar Dynamometer. Measurements were recorded at baseline and after 48 hours of intervention. The statistical analysis was done using Graph Pad Prism 8.3.1 software.

**Results:** The intra group analysis revealed that both pain and grip strength showed significant difference ( $P < 0.001$ ) post the intervention.

**Conclusion:** Results revealed that there is significant reduction in pain and increase in grip strength post 48 hours of intervention.

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### INTRODUCTION

De Quervain's disease, also called Gamer's thumb.<sup>(1)</sup>Fritz De Quervain was the first in 1895, who defined De Quervain's tenosynovitis as a painful complain of the wrist as stenosing tenosynovi ties of thumb abductors around the radiostyloid process.<sup>(2)</sup>De Quervain's disease is thought to be due to thickening of the synovial sheath containing the extensor pollicis brevis (EPB) and abductor pollicislongus (APL) tendons.This leads to irritation of the muscles, causing pain and swelling over the radial side of the wrist in patients.<sup>(1,3)</sup>Pain results from resisted gliding of abductor pollicislongus and extensor pollicis brevis tendons in the fibro-osseus canal.<sup>(4)</sup>It is accompanied by increased difficulty in gripping objects. The activities which involved the repeated thumb pinching and wrist movement can be the consequence of this painful condition<sup>(2)</sup>Video games playing requires many rapid, repetitive thumb and wrist movements which stress the APL and EPB tendons. An analysis of the biomechanics of video games playing indicates that grasping the joystick

controller produces tension on the abductor pollicislongus (APL) and extensor pollicis brevis (EPB) tendons.<sup>(5)</sup>The prevalence of DQST was found 0.5% in man and 1.3% in women.<sup>(6)</sup> The most standard finding in De Quervain's tenosynovitis is a positive Finkelstein test.<sup>(7)</sup>

#### Finkelstein Test

It is a special orthopedic test used to diagnose De Quervain's disease. This test is performed by the patient making fist around their thumb, and then therapist ulnarly deviating their wrist. In this position, the synovial tissue that surrounds the extensor pollicis brevis and abductor pollicislongus tendons is stretched. If they are inflamed and patient is suffering from De Quervain's disease, a positive sign will be indicated by pain in the first compartment of the extensor retinaculum.<sup>(8)</sup>

#### Kinesio Taping

Kinesio taping is a therapeutic taping method using a uniquely designed elastic tape developed by Dr. KenzoKase In 1979.Kinesio taping method is used to treat patients with muscle imbalance, circulatory and lymphatic condition ; ligament, tendon and joint injuries and also in neurological conditions.<sup>(9)</sup>

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**5 Major physiological systems affected by kinesio tape are**

1. Skin
2. Fascia
3. Circulatory / Lymphatic systems.
4. Muscle
5. Joint

Kinesio taping is a relatively new technique used in rehabilitation programs. Although it has been commonly used in orthopedic and sports settings, it is gradually becoming an adjunct treatment option for other musculoskeletal impairments. Its working mechanism is based on taping direction and tension. Kinesio taping application are for both “muscle facilitation or function correction”, “muscle inhibition or muscle unloading” and space correction techniques.

It is theorize that Kinesio tape lifts the skin and takes pressure off the interstitial fluid providing better drainage and reducing inflammation.

**Therapeutic benefits of kinesio tape application to injured tissues are described in these ways**

1. Therapeuticic facilitation, we should apply Kinesio tape from the muscle origin to the insertion which increases muscle contraction.
2. To facilitate an eccentric or diminished contraction, applying Kinesio tape from the insertion to the origin is suggested.

Another theory is gate control theory of pain in which afferent mechanoreceptor signals from Kinesio tape to the brain down regulate nociceptive input because of skin lifting.<sup>(10)</sup>

**MATERIALS AND METHOD**

30 subjects were screened and selected according to the selection criteria through convinient sampling method.

**Inclusion Criteria**

1. Subjects willing to participate.
2. Age group: 15 to 25 years.
3. Both male and female gamers.
4. Individuals with positive Finkelstein test.
5. Playing video games for 2 hours/ day for 6 months.

**Exclusion Criteria**

1. Presence of any other musculoskeletal condition of hand.
2. Neurological condition of hand.
3. Recent fracture of wrist or hand complex < 6 months.
4. Open wounds.
5. Deformity of hand or wrist complex.
6. Inflammatory conditions.

Before starting the study a written informed consent was taken from the selected subjects. Purpose of the study and procedure was explained to the subjects.

Pain was assessed using Numerical Rating Scale (NRS) while Hand grip strength was measured using Jamar Dynamometer. Kinesio taping was applied to selected subjects using 3 I pieces of kinesio tape.

1. First strip (1 inch wide and 6 inches long)- From base of thumb then streched 70% over radial aspect of wrist and ending at mid forearm over extensor surface.

2. Second and third I strip (2 inches wide & 4 inches long). Second strip applied with the wrist extended, putting the end of the tape at the dorsum of the hand and another end at the distal forearm, 1 inch upper than styloids.
3. Third strip : originates from the volar side of distal of radius and stretched obliquely to the dorsum of the hand with a lighter tension.<sup>(10)</sup>

Pain and grip strength was reassessed after 48 hours of kinesio tape application. Data was collected and statistically analysed.

**RESULT**

The statistical analysis of the present study was done using Graph Pad Prism 8.3.1 software to verify the results obtained. Normality of the data for pain scores and grip strength was tested using the Kolmogorov-Smirnov test (KS test). Since the data was not normally distributed for both pain and grip strength, statistical analysis was done using the non-parametric test .

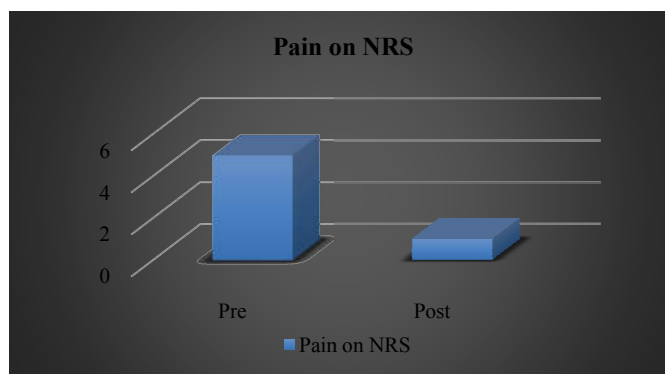
Therefore, intragroup comparison i.e pre and post intervention changes was done using Wilcoxon test. Significance was set at 0.05 and data will be presented as median, standard deviation and its significance based on the p-value.

Table 1

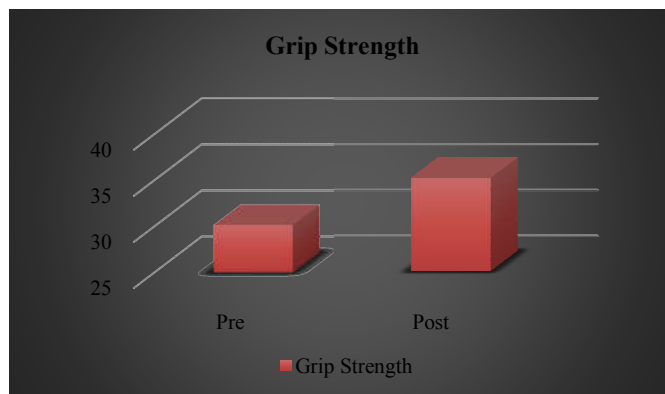
	Median		Standard deviation		p value	Significance
	Pre	Post	Pre	Post		
Pain on NRS	5	1	1.069	1.302	<0.0001	Yes

Table 2

	Median		Standard deviation		p value	Significance
	Pre	Post	Pre	Post		
Grip Strength	30.15	35.195	6.630	6.754	<0.0001	Yes



**Graph 1** Comparing Pain score on NRS pre and post application of kinesio tape.



**Graph 2** Comparing Grip strength pre and post the application of kinesio tape.

## DISCUSSION

30 video game players with gamer's thumb within the age group of 15-25 years were selected. Kinesio taping technique was applied and its effectiveness was studied by comparing the pre and post (48 hours) pain scores using NRS and grip strength using Jamar Dynamometer. The data was collected and analysed using the non-parametric test (Wilcoxon signed-rank test).

There was a significant difference in NRS scores pre (Median = 5) and post (Median=1) the application of kinesio tape ( $p < 0.0001$ ). This finding is justified with the study by Keynoosh Homayouni *et al* who demonstrated that kinesio taping causes significant decrease in pain as compared to conventional Physiotherapy. The decrease in pain after KT can be attributed to the reduction in mechanical stress on free nerve endings within the fascia through fascia unloading. The application of KT created convulsions on the skin which increased the interstitial spaces between the sheets of fascia. Another theory is gate control theory of pain in which afferent mechanoreceptor signals from kinesio tape to the brain regulate nociceptive input because of skin lifting.<sup>(10,11)</sup>

Grip strength also showed significant difference pre (Median = 30.15) and post (Median = 35.195) the application of kinesio tape ( $p < 0.0001$ ). Study done by Venta Donec *et al* suggests kinesiointaping technique did not result in changes to maximal key pinch force after 30 min, but increased maximal key pinch force after 1 h and maximal grip force after 30 min and 1 h following application.<sup>(12)</sup> The finding is also consistent with the study by Thiago Vilela Lemos *et al* who studied the effect of kinesio taping on hand grip strength and demonstrated that the increase in hand grip strength was maintained for 48 hours after its application.<sup>(13)</sup> The present study involved taping the extensor region of hand and forearm causing to increase the grip strength which is consistent with the study by Hosein Kouhza Mohammadi *et al* who suggested that tape application to the extensor region provided greater grip strength compared to taping of the flexor and both flexor and extensor regions. Greater grip strength following taping of extensor muscles of the forearm can be attributed to tonic nature of these muscles and presence of more hair follicles in the area.<sup>(14)</sup> Application of kinesio tape from the insertion to origin facilitates an eccentric or diminished contraction.<sup>(10)</sup> The significant increase in the grip strength also occurs because taping technique disperses the stresses generated by muscle contraction, thereby reducing protective pain-related inhibition and allows the subject to contract more forcefully. Previous studies suggested that through skin stretching, kinesio tape increases mechanoreceptor stimulation and sensory feedback of the taped region, facilitates muscle contraction and ultimately promote muscle strength.<sup>(14,15)</sup>

A systematic review done by Guardia MC. to determine the effectiveness of kinesio taping for Dequervain's tenosynovitis suggested considering kinesio tape as an adjunct to conservative treatment for Dequervain's Tenosynovitis.<sup>(15)</sup>

On basis of statistical reference, the present study supports the previous studies suggesting the use and treatment efficacy of kinesio taping for musculoskeletal conditions. However, the present study aimed at studying the effects of kinesio taping on pain and grip strength in video game players with gamer's thumb. The statistical analysis conclude that there is

significant reduction in pain and increase in grip strength post the application of kinesio tape.

## CONCLUSION

The present study on Effects of Kinesio taping on pain and grip strength in video game players with Gamer's thumb concluded that there is significant reduction in pain and increase in grip strength post (48 hours) the application of Kinesio tape.

## Limitations

The limitations of this study are it's sample size and the period of intervention is 48 hours. Long term effects after the removal of the kinesio tape should also be considered.

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