A STUDY ON EFFECTIVENESS OF GRASTON TECHNIQUE WITH TENDON GLIDING EXERCISES ON DE - QUERVAINS TENOSYNOVITIS IN STUDENTS

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ABSTRACT

BACKGROUND:

De-quervains tenosynovitis is a repetitive overuse condition of the thumb. It is an inflammatory condition affecting the first dorsal compartment of the wrist. It is also referred to as stenosing tenosynovitis, commonly affecting APL and EPB tendons. The main etiology of this disease is due to continuous strain of the APL and EPB tendons caused due to repetitive thumb movements. There is thickening of the extensor retinaculum caused by the continous inflammation of the APL and EPB tendons and their tendon sheaths, which affects the smooth gliding of these tendons. It is characterized by pain and tenderness over the first dorsal compartment of the wrist leading to functional impairment.

OBJECTIVES:

The objective of this study is to evaluate the effectiveness of Graston Technique with Tendon Gliding Exercises in order to reduce pain and improve hand function in students with De-quervains tenosynovitis.

METHODOLOGY:

A total of 30 participants including both males and females aged 18-25 years with positive Finkelstien tests and fulfilling the requirements according to both inclusion and exclusion criteria were selected by convenient method.The intervention was delivered for 10 consecutive days,consisting of graston technique was performed for 3 sets for 3min / day, and 5 sessions / week for 2 weeks, accompanied with tendon gliding exercises which were performed two sets of five repetitions of each per session, holding each position for five seconds.Pain levels were assessed using NPRS (numerical pain rating scale)and hand function was evaluated using Brief Michigan Hand Questionnaire(MHQ). Outcome measures were recorded at baseline and after 10 days of intervention.

RESULTS:

The statistical analysis shows that Graston Technique with Tendon Gliding Exercises is effective in students with De - Quervains Tenosynovits.

CONCLUSION:

That study concludes that that Graston Technique with Tendon Gliding Exercises is effective in reducing pain improving hand function in students with De - Quervains Tenosynovits.

KEY WORDS:

De-quervains tenosynovitis, Finkelstien test, Graston Technique, Tendon Gliding Exercises, Nunerical pain ratng scale(NPRS), Brief Michigan Hand Questionnaire.

INTRODUCTION:

De - quervains tenosynovitis is a repetitive, overuse, painful disorder that affects the wrist and forearm, especially around the thumb. It is brought on by inflammation of the synovial sheaths of abductor pollicis longus and extensor pollicis brevis tendons[1]. Figure 1.

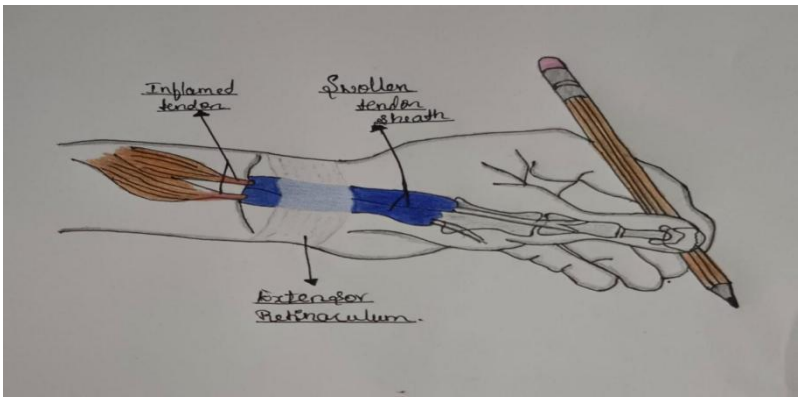


Figure 1:- De - quervains tenosynovitis

This disease is characterized by the thickening of APL and EPB tendon sheaths which passes through the first dorsal compartment of the wrist, which is covered by extensor retinaculum[1,2]. The main etiology of this condition is unknown[10]. But has been linked to excessive and frequent use of wrist and thumb, such as radial and ulnar deviation, griping and grasping, holding the thumb in an extended and an abducted position[4,5]. This leads to irritation, inflammation and thickening of the tendon

sheaths by formation of the fibrous tissue, which results in stenosis of the tendon sheaths[4]. This in turn affects the smooth gliding of the APL tendon inserted at first metacarpal bone and EPB tendon inserted at the proximal phalanx of the thumb Figure 2 , in the narrowed first dorsal compartment of the extensor retinaculum[2,5].

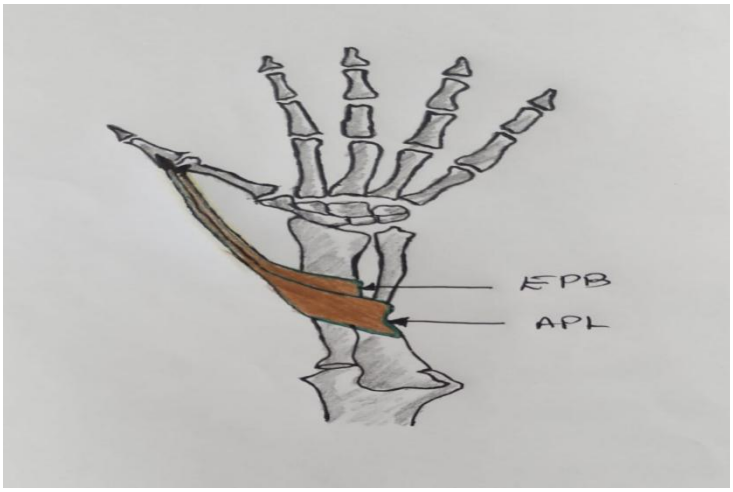


Figure 2:- Anatomy of APL and EPB tendon

It is prevalent among variety of population such as tailors, mechanics, computer users, golfers, pianist, fishermen, painters, mobile phone users, where it can also be called as “Gamers thumb”, “Blackberry thumb”, “Texting tenovitis”[1,5,6]. The appraised

prevalence of De - quervains tenosynovitis is around 0.5% in men and 1.3% in women[8]. It is more common in women due to the difference in anatomical angulation of the dorsal retinacular tunnel as compared to men[1]. It is sometimes also known as “Mommy’s thumb” as it predominantly affects the new mothers and daycare workers[8]. The cause of De - quervains tenosynovitis in students is due to frequent use of thumb in case of writing, texting SMS, using computers and mobile phones for the access of various

information[4]. Specific activities such as stapling, grooming hair, wring a washing cloth, writing, shaving, hammering a nail, clasping a steering wheel of a vehicle, using flatwares can exaggerate the symptoms[4,2,6].

Individuals with De - quervains tenosynovitis often complains of pain, swelling inflammation around the region of first dorsal compartment which is located at the radial styloid process[1,2]. There may be accompied symptoms such as feelimg of numbness, tingling, burning and difficulty in grasping and holding something which in turn leads to functional impairments[1,5]. Some patients may also experience soreness on the radial of the wrist[10]. On palpation there is evidence of tenderness present at the 1st dorsal compartment of the wrist and along the radial styloid process[11].

For diagnosing De - quervains tenosynovitis, Finkelstein's test is used, which is a helpful diagnostic tool to identify the condition. In this test the thumb is flexed towards the palm while the wrist is deviated toward the ulnar side[6]. A positive test is indicated when the person feels pain in the dorsolateral area of the wrist[6]. Figure 3

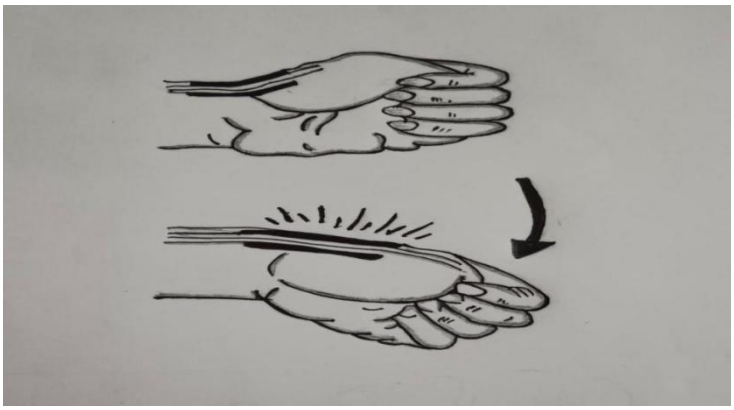


Figure 3:- Finkelstein's Test

Along with Finkelstein's test, patients having medical history of radial wrist atraumatic pain and physical examination are also helpful in diagnosing this condition[10]. Occasionally an ultrasound may be required to confirm the diagnosis[8]. A thicker extensor retinaculum, hypervascularization on Doppler ultrasonography and thickening of APL and EPB tendons are the possible ultrasound finding[10].

Management of De - quervains tenosynovitis consists of rest and immobilization, pharmacological interventions and physical therapy[1,8]. In failure to these conservative management surgical procedures can be performed[8].

The thumb spica splint is used for immobilization. this splint immobilizes the wrist in neutral, carpometacarpal joint in 30^0 flexion, thumb in 30^0 abduction with IP joint freely movable, thereby assist in pain reduction[2]. Figure 4.

Figure 4:- Thumb Spica Splint.

pharmacological interventions includes NSAID's ,Intracompartment corticosteroid injections along with splinting are used to reduce pain and inlammation[8,9]. In RCT's corticosterd injection's success rate shows a range from 50% to 100% for De - quervains tenosynovitis[9].

Ionotophoresis is a physical therapy used to deliver NSAID's, typically with dexamethasone, which has also been proven to be successful for pain reduction[2].

Therapeutic ultrasound is a electrotherapeutic modality used for various musculoskeletal conditions to reduce pain and improve healing of wounds, tendons by the use of high frequency sound waves. For De - qurvains tenosynovitis typically a frequency of 3Mhz and intensity from 0-2.0w/cm is used[2].

Isometric thumb extention exercises and MWM are found to be effective in treating De - quervains tenosynovitis[9,1].

De - quervain's original surgical procedure usually involves a longitudinal approach with pulley incision, which relieved pain, but brings upon a risk of compications, mainly tenton sublaxation and scar tissue dystrophy. A study shows that the Le Viet technique can be used as a surgical procedure, which gives reliable results, with no complications or recurrence.[12].

As many studies suggests that De - quervains tenosynovits can be cured by both conservative and surgical procedures. This study aims to find out the effectiveness of Graston Technique which is a mannual therapy technique along with Tendon Gliding Exrecises in order to reduce pain and to improve the hand function in students population

AIMS:

This study aims to study the effectiveness of Graston Tecnique with tendon gliding exercises in management of De- Quervains Tenosynovitis in order to reduce pain and improve hand function in students.

OBJECTIVES:

The objectives of the study are:

To find out the effectiveness of Graston Technique with Tendon Gliding Exercises on reducing pain in students with De-Quervains Tenosynovitis.

To find out the effectiveness of Graston Technique with Tendon Gliding Exercises in improving the hand function in students with De-Quervains Tenosynovitis.

METHODOLOGY:

SOURCE OF DATA: The patients for study are taken from the Dr. BR Ambedkar college of Physiotherapy, Bangalore.

STUDY DESIGN:

- STUDY TYPE: Experimental study
- SAMPLING TECHNIQUE: Convenient sampling technique
- SAMPLE SIZE: 30
- DURATION OF STUDY: The duration of the study is 6 months

INCLUSION CRITERIA:

- Individuals with de-quervains tenosynovitis with positive Finkelstein test.
- Age:- 18-25 years of age.
- Both males and females.
- Thumb pain in dominant hand lasting for atleast 2 weeks.
- Pain intensity greater than 3 on NPRS scale.

EXCLUSION CRITERIA:

- The use of medications such as NSAIDs or steroids.
- A history of hand surgery or fractures or arthritis.
- Any integumentary conditions affecting the hand.

OUTCOME MEASURES:

- PAIN INTENSITY ASSESSMENT (NUMERICAL PAIN RATING SCALE)
- HAND FUNCTION ASSESSMENT (Brief Michigan Hand Questionnaire)

SCREENING TEST:

FINKELSTIEN TEST

STUDY PROCEDURE:

The study included 30 students with De - Quervains Tenosynovitis, meeting both inclusion criteria and exclusion criteria. Pain was assessed using NPRS and hand function was assessed using Brief MHQ. All 30 participants received Graston Technique with Tendon gliding exercises. Both pre and post assessment were taken.

Graston Technique PROCEDURE:-

Participant will be sitting on a chair with armrest and elbow supported. A moisturizer is applied on the 1st dorsal compartment, on the dorsal aspect of the thumb and on the thenar muscles. Examiner uses the Graston tool and performs the mobilization gently and carefully. Graston Technique was performed for 3 sets for 3min / day, and 5 session /week for 2 weeks.[21]

FIG 11: GRASTON TECHNIQUE PROCEDURE

TENDON GLIDING EXERCISES PROCEDURE :-

Tendon gliding exercises were performed for thumb.

- Wrist maintained in extension and IP maintained in extension, bend the MP into full flexion.
- Wrist maintained in extension and MP maintained in extension, bend the IP into full flexion.
- With wrist in extension, bring the thumb into full extension and held gently.
- Composite flexion and extension of thumb.
- Hand placed on the table and bring the thumb into full extension and hold it.[15]

FIG 12: TENDON GLIDING EXERCISES

These exercises were performed at two sets of five repetitions of each per session, holding each position for five seconds.[1]

These exercises were performed after performing Graston Technique.

DATA ANALYSIS AND RESULTS:

Statistical analysis of the data was performed using SPSS 20.0. The Categorical variables were presented as frequency and percentage. The continuous variables were presented as mean ± SD. Pre post comparison was done using paired t test and between group comparisons was done using unpaired t test. A p value <0.05 was considered statistically significant.

Table 1: Age wise distribution

Age groups	Number	%
<=20yrs	12	40.00
21-25yrs	18	60.00
Total	30	100.00
Mean	21.30	
SD	1.74	

In age wise distribution individuals with age of < = 20 years were 12 making a total population of 40% and individuals with a age between 21-25years were 18 making a total population of 60%. The Mean of the data is 21.30 and SD is 1.74.

Graph 1: Age wise distribution

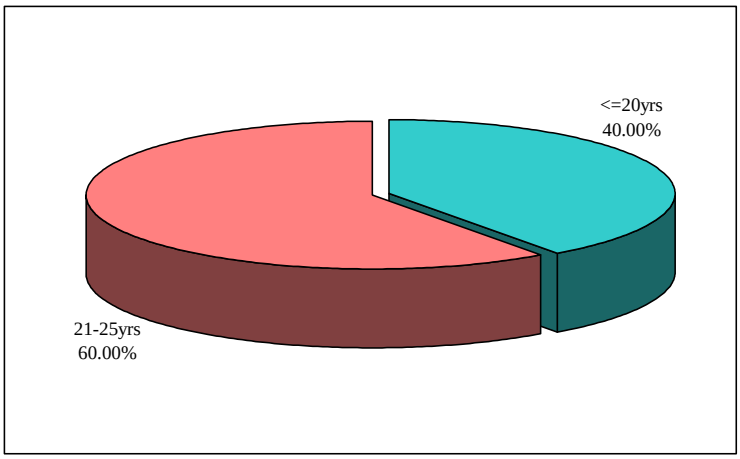


Table 2: Gender wise distribution

Gender	Number	%
Male	15	100.00
Female	15	100.00
Total	30	100.00

There is a equal distribution in gender between male and female. Both male and female being 15 in number with 100% equal distribution.

Graph 2: Gender wise distribution

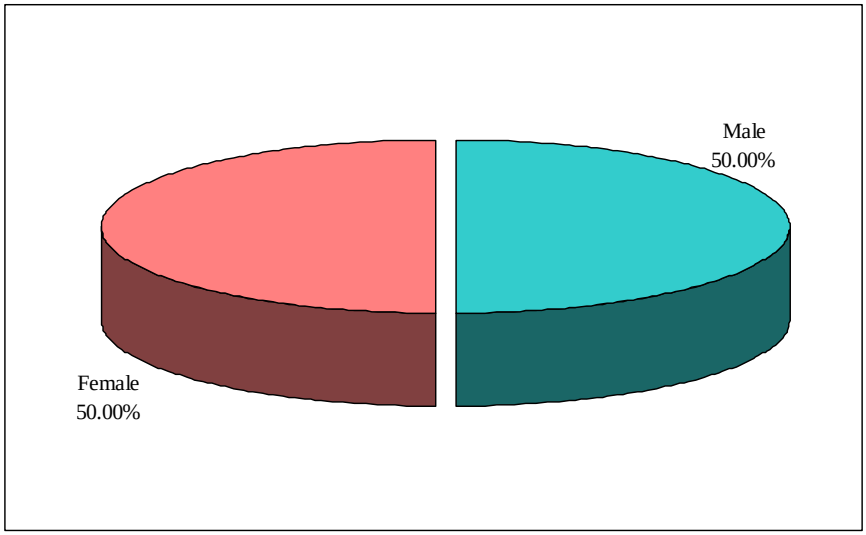


Table 3: Comparison of Day 1 and Day 10 treatment time points with pain scores by Wilcoxon matched pairs test

Time points	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Effect size	Z-value	P-value
Day 1	5.50	1.36	2.93	1.93	53.33	2.16	4.7030	0.0001*
Day 10	2.57	1.48						

*p<0.05

- A significant difference was observed between Day 1 and Day 10 treatment time points with pain scores (Z=4.7030, p=0.0001) at 5% level of significant. It means that, a significant of 53.33% (effect size=2.16) decrease was observed in pain scores after day 10.

Graph 3: Comparison of Day 1 and Day 10 treatment time points with pain scores

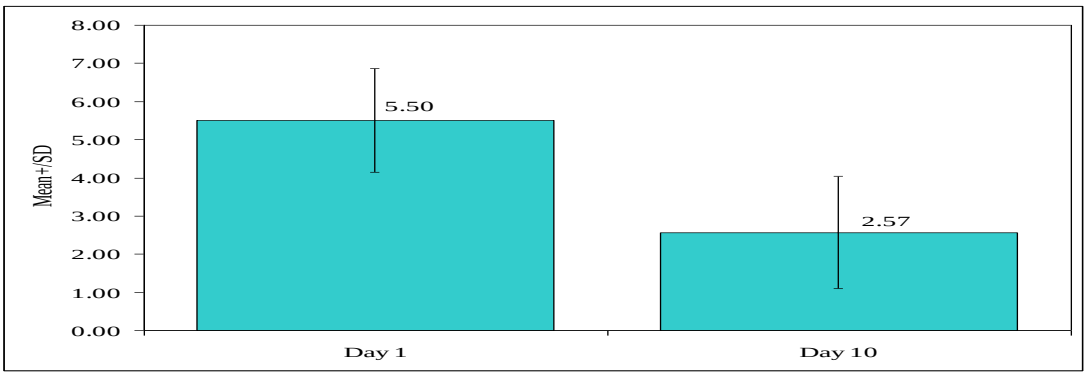


Table 4: Comparison of Day 1 and Day 10 treatment time points with levels of pain

Levels	Day 1	%	Day 10	%
None	0	0.00	2	6.67
Mild	1	3.33	23	76.67
Moderate	23	76.67	5	16.67
Severe	6	20.00	0	0.00
Total	30	100.00	30	100.00
Wilcoxon matched pairs test, Z=4.3724, p=0.0001*				

*p<0.05

In comparison of treatment time points with levels of pain, on day 1 individuals with moderate level of pain were 23 showing pain level of 76.67%. 6 individuals with severe levels of pain showing 20% of pain level and 1 individual with mild pain showing 3.33% of pain level. But by day 10, a significant improvement was observed where 23 individuals had mild level of pain showing 76.67% , 5 individuals had moderate level of pain showing 16.67% and 2 individuals had no pain showing 6.67%, which suggests a significant improvement of z = 4.3724 , p=0.0001.

Graph 4: Comparison of Day 1 and Day 10 treatment time points with levels of pain

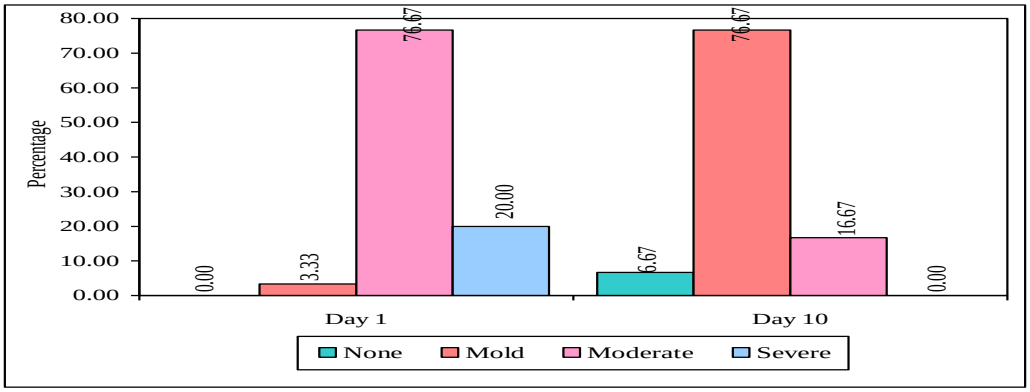


Table 5: Comparison of male and female with pain scores at Day 1 and Day 10 by Mann-Whitney U test

Time points	Male			Female			Z-value	p-value
	Mean	SD	Men rank	Mean	SD	Mean rank		
Day 1	5.27	1.22	14.30	5.73	1.49	16.70	-0.7259	0.4679
Day 10	1.93	1.03	11.97	3.20	1.61	19.03	-2.1776	0.0294*
Difference	3.33	1.45	18.17	2.53	2.29	12.83	1.6384	0.1013

*p<0.05

No significant difference was observed between male and female with pain scores at Day 1 (Z=-0.7259, p=0.4679) at 5% level of significance. It means that, the pain scores at Day 1 is similar in male and females.

A significant difference was observed between male and female with pain scores at Day 10 (Z=-2.1776, p=0.0294) at 5% level of significance. It means that, the pain scores at Day 10 is significantly higher in females as compared to males.

No significant difference was observed between male and female with changes in pain scores from Day 1 to Day 10 (Z=1.6384, p=0.1013) at 5% level of significance. It means that, the changes in pain scores from Day 1 to Day 10 is similar in male and females.

Graph 5: Comparison of male and female with pain scores at Day 1 and Day 10

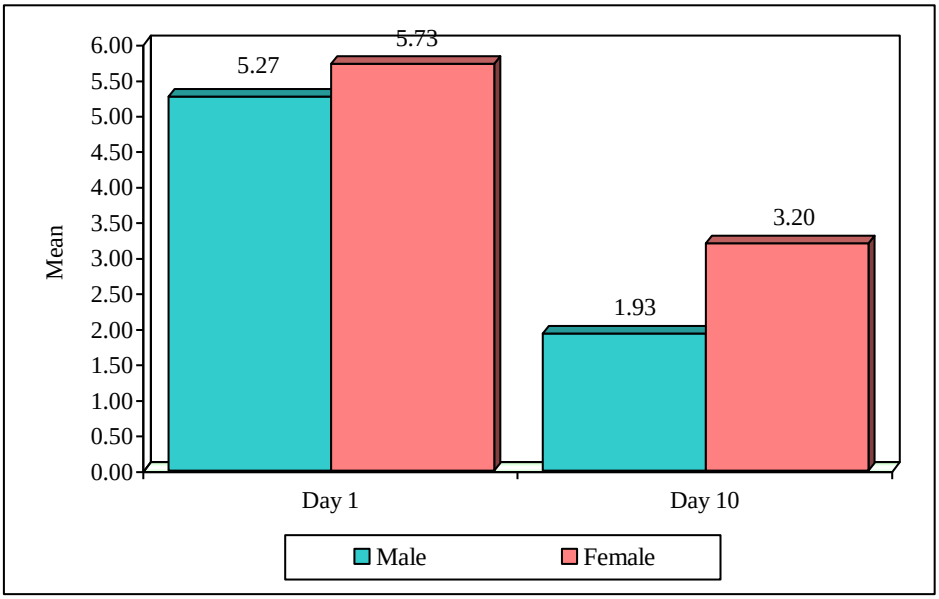


Table 6: Normality of DE-Quervains Tenosynovitis using Michigan hand scores at day 1 and day 10 in male and female by Shapiro-Wilk

		Shapiro-Wilk	df	Sig.
Day 1	Male	0.9480	15	0.4960
	Female	0.9510	15	0.5390
Day 10	Male	0.8880	15	0.0620
	Female	0.9080	15	0.1250
Difference	Male	0.8900	15	0.0660
	Female	0.9230	15	0.2150

Note that, the scores of DE-Quervains Tenosynovitis using Michigan hand follow normal distribution. Therefore, the parametric tests were applied.

Gender wise analysis of Michigan hand questionnaire scores for normality was done using shapiro-wilk test. On day 1 males showed a significance of 0.4960 which decreased to 0.0620 on by day 10.And females showed a significance of 0.5390 which decreased to 0.1250 by day 10. The significant difference between day 1 to day 10 was 0.0660 in males and 0.210 in females.

Table 6: Comparison of Day 1 and Day 10 treatment time points with DE-Quervains Tenosynovitis using Michigan hand scores by dependent t test

Time points	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Effect size	t-value	P-value
Day 1	69.70	8.27						
Day 10	82.56	9.05	-12.87	9.80	-18.46	-1.56	-7.1898	0.0001*

*p<0.05

- A significant difference was observed between Day 1 and Day 10 treatment time points with DE-Quervains Tenosynovitis using Michigan hand scores (Z=-7.1898, p=0.0001) at 5% level of significant. It means that, a significant of 18.46% (effect size=1.56) increase was observed in pain scores after day 10.

Graph 7: Comparison of Day 1 and Day 10 treatment time points with DE-Quervains Tenosynovitis using Michigan hand scores

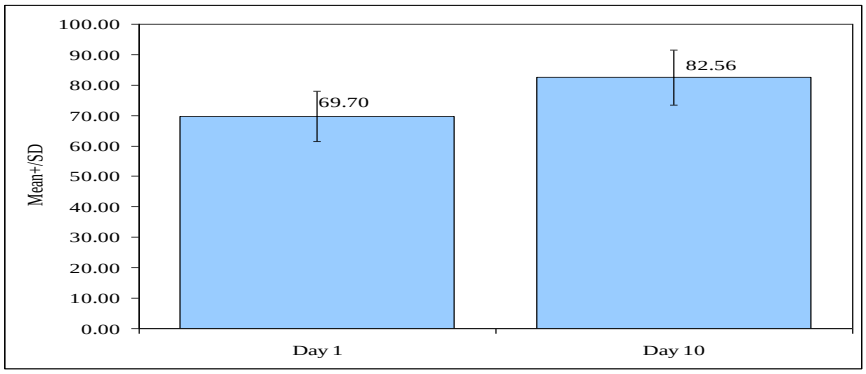


Table 8: Comparison of male and female with DE-Quervains Tenosynovitis using Michigan hand scores at Day 1 and Day 10 by Mann-Whitney U test

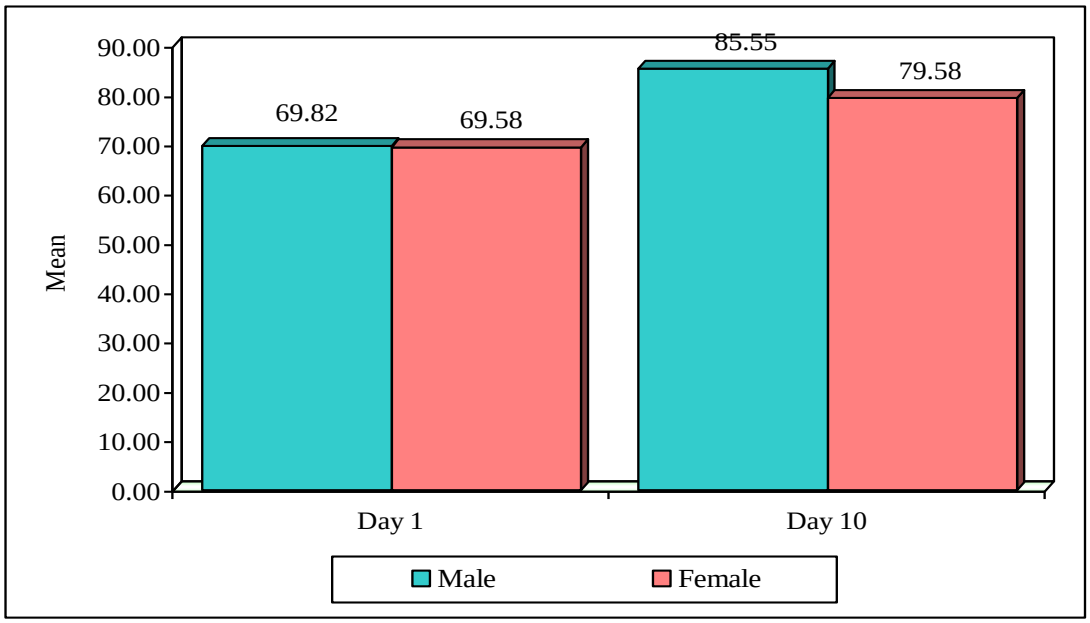
Time points	Male		Female		t-value	p-value
	Mean	SD	Mean	SD		
Day 1	69.82	8.00	69.58	8.80	0.0781	0.9383
Day 10	85.55	6.62	79.58	10.33	1.8836	0.0700
Difference	15.73	8.50	10.00	10.45	1.6469	0.1108

No significant difference was observed between male and female with DE-Quervains Tenosynovitis using Michigan hand scores at Day 1 (t=0.0781, p=0.9383) at 5% level of significance. It means that, the DE-Quervains Tenosynovitis using Michigan hand scores at Day 1 is similar in male and females.

A significant difference was observed between male and female with DE-Quervains Tenosynovitis using Michigan hand scores at Day 10 (t=1.8836, p=0.0700) at 5% level of significance. It means that, the DE-Quervains Tenosynovitis using Michigan hand scores at Day 10 is similar is male and females.

No significant difference was observed between male and female with changes in DE-Quervains Tenosynovitis using Michigan hand scores from Day 1 to Day 10 (t=1.6469, p=0.1108) at 5% level of significance. It means that, the changes in DE-Quervains Tenosynovitis using Michigan hand scores from Day 1 to Day 10 is similar in male and females.

Graph 8: Comparison of male and female with DE-Quervains Tenosynovitis using Michigan hand scores at Day 1 and Day 10



DISCUSSION:

This study focused in finding out the effectiveness of Graston Technique with Tendon Gliding Exercises on De - Quervains Tenosynovitis in students. De - Quervains Tenosynovitis is a painful condition affecting mainly the thumb, wrist and forearm. It is mainly caused due to repetitive and overuse of the thumb resulting in inflammation of the synovial sheaths of EPB and APL tendons. The prevalence of De - Quervains Tenosynovitis is seen in variety of population. In case of students De - Quervains Tenosynovitis is caused due to frequent or repetitive use of thumb.

In this study, students with De - Quervains Tenosynovitis are taken into account. Students for the study are selected on the basis of those fulfilling the inclusive and exclusive criteria, and with positive Finkelstein's test. 30 students with De - Quervains Tenosynovitis experiencing pain(NPRS > 3) and decreased hand function were selected and were grouped for the experimental study. These students received Graston Technique of 3 sets for 3min/day with a total of 5 session/week for 2 weeks. Along with this Tendon Gliding Exercises of 2 sets of 5 repetition of each exercises/session with a 5 sec hold.

The outcome measures used were, NPRS to measure pain intensity and Brief Michigan Hand Questionnaire to assess hand function. Each outcome measure was assessed on day 1 before treatment and on day 10 after treatment. Then the obtained data was statistically analyzed.

Statistical data reveals that Graston Technique with Tendon Gliding Exercises showed a significant effect in students with De - quervains Tenosynovitis.

According to James McKivigan, Graston Technique is a form of IASTM that helps the clinician to identify scar tissues and tissue restrictions in the body which causes pain and aids the clinicians to treat them. A specialized form of massage technique along with a stainless steel instrument is used, where the skin is gently scraped to induce micro trauma, which in turn helps in healing. The main effect of this Graston Technique is to reduce pain and it can also improve functioning of the soft tissues. It increases blood flow and aids in restoring movement pattern thereby helps in better healing[3].

Graston Technique provides an tactile feedback to both clinician and patient in detecting soft tissue adhesions, (Jeanmaria Burke et.al; 2006)[13].

Tendon Gliding Exercises, involves specific thumb and wrist movements which provides gliding of the APL and EPB tendon of the thumb. These exercises are considered to be essential in rehabilitating hand injuries. These exercises helps in smooth gliding of tendons and musters the hand for better functional activities, (Rubina Zulfqar et.al; 2025)[1].

In this study, there has been a decrease in pain and improved hand function by the application of Graston Technique with Tendon Gliding exercises for De - Quervains Tenosynovitis.

With respect to NPRS, the average score on day 1 is 5.50 ± 1.36, which decreased to 2.57 ± 1.48 by day 10. The average improvement was 2.93 with a $Z = 4.7030$ and P value < 0.001. This indicates that there was a significant reduction in pain by end of the session.

On day 1, the NPRS scores indicated that 23 individuals experienced moderate pain and 6 experienced mild pain. By day 10, after the treatment 23 individuals experienced mild pain, 5 experienced moderate pain and 2 individuals had no pain at all. This implies that there's a significant decrease in pain levels over the 10 day period.

With respect to Brief MHQ, the average score on day 1 was 69.70 ± 8.27 and by day 10 it was 82.56 ± 9.05 with % of change of -18.46 and effect size of -1.56. Indicating the hand function improved significantly by day 10 after treatment.

This study showed a significant effect in pain reduction and improving hand function in students with De - Quervains Tenosynovitis by using Graston Technique and Tendon Gliding Exercises. So this Graston Technique can be used to treat other conditions among various population for further research.

CONCLUSION

The purpose of this study was to find out the effectiveness of Graston Technique with Tendon Gliding Exercises on De - Quervains Tenosynovitis in students. 30 students were treated Graston Technique with Tendon Gliding Exercises of 5 sessions/ week for 2 weeks. Based on statistical analysis, this study showed a effect in decreasing pain and improving hand function of students with De - Quervains Tenosynovitis.

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