Original Study

Comparative Study of Extinguishing and Upcoming Manual Therapy Techniques in Dentists Having Stage II of Carpal Tunnel Syndrome

Chitvanjeet Kaur[1], Aman Navneet Kaur[2]

[1]Assistant Professor, Guru Nanak Dev University, [2]Assistant Professor, Khalsa College Amritsar.

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Abstract

Background: Carpal Tunnel Syndrome occurs when median nerve is compressed as it travels through the wrist. The syndrome is characterized by pain in the hand, numbness, and tingling in the distribution of the median nerve and leads to reduction in grip strength and hand function. Stage II Carpal Tunnel Syndrome occurs when patient is involved in activities of repetitive movement of wrist during day. The study aimed to compare functional improvement in results after treating with Extinguishing manual therapy techniques and Upcoming manual therapy techniques.

Materials and Methods: In this experimental study 30 dentists having Stage II Carpal Tunnel Syndrome were treated first with extinguishing manual therapy techniques (Phase I) for 10 days and then there was a gap of 1 week to decondition the effects of Phase I. After deconditioning same group of patients were treated with Upcoming manual therapy techniques for 10 days. In both the Phases Conservative therapy was also included. Patient specific activity scoring scheme and Boston scale were used to compare the results.

Conclusion: The study concluded that Upcoming manual therapy are more effective than extinguishing manual therapy techniques in treating dentists having Stage II Carpal Tunnel Syndrome.

Keywords*: Carpal Tunnel Syndrome, Osteopathy, Reflexology, Cyriax mobilization, Nerve flossing.*

Introduction

Carpal Tunnel Syndrome is a common medical condition that remains one of the most frequently reported forms of median nerve compression. Carpal Tunnel Syndrome occurs when the median nerve is squeezed or compressed as it travels through the wrist. The syndrome is characterized by pain in the hand, numbness, and tingling in the distribution of the median nerve[1]. Both Dental and Dental hygienists have been reported to have a high prevalence of upper extremity musculoskeletal disorders, including Carpal Tunnel Syndrome. Carpal Tunnel Syndrome is 10 times more frequent in women than men. Overall, Carpal Tunnel Syndrome is ranked sixth among recognized occupational diseases. The Primary sign is pain in the wrist, tingling sensation, pain or numbness in the thumb, index finger, medial finger and radial side of the tiny finger, also there is a reduction of the grip strength and function of the affected hand **Dental Procedures and their biomechanics Involved in Stage II Carpal Tunnel Syndrome[3]**

Corresponding Author: Chitvanjeet Kaur, Assistant Professor, Dept of Physiotherapy, Guru Nanak Dev University, Amritsar, Punjab.

E-Mail: chitvanjeet@gmail.com

Occupational reasons leading to Carpal Tunnel Syndrome include repetitive bending movements of wrist to catch devices forcefully with ulnar deviation and repetitive pressure on palm. In dentistry practices, these movements (especially repetitive movements of wrist) are used during exfoliation and canal cleaning that can compress median nerve. Scaling and root planning pose a high ergonomic risk for both, dentists and dental hygienists[4].

For smaller to larger activities muscle has to constantly work. Drilling activity needs the tool to be held strongly for which muscle work increases. In all the three activities the dentists use a precision grip for holding the instruments. This requires proper stabilization of the wrist which is brought about by the extensors and the flexors of the forearm; thus, it places more demand on the extensor carpi radialis longus and brevis as well as the flexor carpi ulnaris muscle[8].

Drilling activity needs the tool to be held strongly for which muscle work increases. In all the three activities the dentists used a precision grip for holding the instruments. This requires proper stabilization of the wrist which is brought about by the extensors and the flexors of the forearm; thus, it places more demand on the Extensor Carpi Radialis Longus and Brevis as well as the Flexor Carpi Ulnaris muscle. Also, the movements of the wrist consisted mainly of wrist extension (which remained static) along with repetitive ulnar and radial deviation which indicates that there is a specific arc of movement that is followed by the wrist which demands stability along with mobility and is achieved by the Extensor Carpi Radialis Longus[4].

While drilling, continuous vibration is felt in the fingers and along with the vibrations working in a specific dimension can impose more work on the forearm muscles for stabilization which can explain the maximum activity of the muscles in drilling. Thus, even though pulp excavation needs stabilization it does not need much of wrist movements which could be the reason that the muscle work of the Flexor Digitorum Superficialis and Flexor Pollicis Longus is significant in this activity[4]. Filling is another activity which is performed most frequently in the Conservative Dentistry department. Prolonged working periods may be associated with the increased risk of the Carpal Tunnel Syndrome [5]

Thus, the aim of this present study was to to evaluate that upcoming manual therapy are giving better results than extinguishing manual therapy in dentists having Stage II of Carpal Tunnel Syndrome. To compare both types of manual therapies (upcoming andextinguishing) on dentists having Stage II of Carpal Tunnel Syndrome.

Methods

Research Design

Quantitative Research Design (Solomon four group design)

Research Type:

True Experimental Research (Cause and Effect type)

Research Setting:

Various dental clinics of Batala and Amritsar

Research Sample and Population:

30 dentists were selected on the basis of inclusion and exclusion criteria

Sampling Method:

Stratified Random sampling method was used for selecting sample of 30 dentistshavingStage II of Carpal tunnel syndrome.

Selection criteria:

Inclusion criteria

- Dentists having stage II Carpal tunnel syndrome and who are willing to participate
- Dentists who work more than 20 hours in a week
- Age group (25-45 years)
- Dentists having Carpal tunnel due to mechanical stress (repetitive work Stage II Carpal tunnel syndrome)
- Both males and female

Exclusion criteria:

- Other conditions that involve repetitive stress other than Stage II carpal tunnel.
- Trauma to the wrist
- Post-surgical complications involving wrist

- Dentists having symptoms of any other musculoskeletal, visceral underlying pathology of variable origin except Stage II Carpal tunnel syndrome.
- Median nerve impingement excluding carpal tunnel syndrome.
    - Under age 25 and above age 45

Variables

Dependent variables:

- Boston carpal tunnel questionnaire
- Dentists who are working for more than 20 hrs a week.
- Age
- Patient specific activities scoring scheme

Independent variables:

- Nerve flossing technique
- Mobilization technique(cyriax)
- Reflexology technique
- Osteopathy technique
- Dentists having Stage II Carpal tunnel syndrome

Instruments and Tools:

- Questionnaire (Boston carpal tunnel questionnaire)
- Patient specific activity scoring scale
- Therapeutic Ultrasound

Procedure

A total of 30 subjects were selected on the basis of inclusion and exclusion criteria. Subjects were asked to fill Patient specific activity scoring scale for Functional Assessment and the Boston Carpal Tunnel Questionnaire.

PHASE I: Patients were treated using extinguishing manual therapy techniques (Nerve flossing and Cyriax mobilization) for 10 days and then there was be a gap of 7 days to decondition the effects of previous treatment

For Nerve Flossing

Patient's position: Standing

Therapist's position: Standing at alongside of patient

Procedure: Hold each position for 3 to 7 seconds

- Make a fist with thumb outside your fingers
- Extend your fingers while keeping your thumb close to the side of hand
- Keep your fingers straight and extend your wrist
- Keep your fingers and wrist in position and extend your thumb
- Keep your fingers, wrist and thumb extended and turn your forearm palm up.
- Keep your fingers, wrist and thumb extended and use your other hand to gently stretch the thumb.

For Deep Friction Massage (Cyriax mobilization):

Patient's position -Sitting on chair arm resting on table.

Therapist's position – Sitting along affected side of patient.

Procedure – Deep transverse friction massage on the carpal tunnel site at the wrist joint for 5 mins, by the thumb of therapist in position of extension and press during massage.

DECONDITIONING PHASE: After phase I treatment there was a gap of 7 days to decondition the effects of phase I treatment.

PHASE II: Same patients were treated using Upcoming manual therapy techniques (reflexology and osteopathy) for 10 days.

For Osteopathy

Patient's position- Supine lying

Therapist's position- Sitting along affected side of patient.

Procedure -With the patient in the supine position, with a pronated forearm (with the patient's palm facing the ground), the physician places their thumb pads on the proximal carpal row while their fingertips are in contact with the thenar and hypothenar eminences of the affected hand. The physician then brings the wrist through full flexion and extension while adding radial and ulnar gliding. An important component of the treatment is when

the patient's wrist is brought into full extension the physician's fingers, which are applying lateral traction to the thenar and hypothenar eminences and simultaneously applying a distraction pressure to gently separate the carpal bones.

For Reflexology

Patient's position-Sitting on chair with affected side resting on table

Therapist's position- Sitting on chair facingat patient's affected side

Procedure

- Therapist will roll his thumb over complete hand area on whichever hand is afflicted and wherever there is pain.
- The first one is on the inner wrist crease, there is a depression right in the middle. That's the point which you need to knead. And on the other side, again on the outer wrist crease, there is an indentation in the middle. Hold these points for up to one minute as you breathe deeply.
- The second set of points is three finger widths below those points. And again, on the other side three finger widths below those points. Press the points for about one minute as you continue to breathe deeply.
- The last one is below the thumb on the outer wrist crease. More specifically, it's between the two tendons when you tend to open your thumb. Press this point for up to one minute as you focus on your breathing.

Results

The data was statistically analysed by using IBM SPSS Statistics Software package (version 16.0). Level of significance was considered as 5 percent ($p<0.05$). Data was reported as mean +_ standard deviation (SD). Paired student t-test was used to compare the improvement (Result) in Phase I and Phase II.

Table 1: Describes the Initial I and After phase I mean and standard deviation of Group A that significantly changed from 4.59 to 5.12 and 1.031 to 1.029 respectively.

Paired T Test	**Group A (Patient Specific Activity Scoring Scheme)**	
	R1 (Extinguishing Techniques)	
	Initial 1	**After phase I**
Mean	4.59	5.12
S.D.	1.031	1.029
Number	30	30
Maximum	7	7.8
Minimum	3	3.4
Range	4	4.4
Mean Difference	0.53	
Paired T Test	7.308	
P value	<0.001	
Table Value at 0.05	2.05	
Result	Significant	

Table 2: Describes the Initial I and After phase I mean and standard deviation of group B that significantly changed from 2.09 to 1.95 and 0.292 to 0.248 respectively

Paired T Test	**Group B (Boston Scale)**	
	R1 (Extinguishing Techniques)	
	Initial 1	**After phase I**
Mean	2.09	1.95
S.D.	0.292	0.248
Number	30	30
Maximum	2.54	2.54
Minimum	1.63	1.63
Range	0.91	0.91
Mean Difference	0.14	
Paired T Test	5.139	
P value	<0.001	
Table Value at 0.05	2.05	
Result	Significant	

Table 3: Describes Initial 2 and After phase II mean and standard deviation of group A that significantly changed from 4.96 to 6.18 and 1.017 to 0.990 respectively

table 3:

Paired T Test	Group A (Patient Specific Activity Scoring Scheme)	
	R2 (Upcoming Techniques)	
	Initial 2	After phase II
Mean	4.96	6.18
S.D.	1.017	0.990
Number	30	30
Maximum	7.8	7.8
Minimum	3.2	3.4
Range	4.6	4.4
Mean Difference	1.22	
Paired T Test	9.985	
P value	<0.001	
Table Value at 0.05	2.05	
Result	Significant	

Table 4: Describes Initial 2 and After phase II mean and standard deviation of group B that significantly changed from 1.98 to 1.48 and 0.244 to 0.327 respectively

Paired T Test	Group B (Boston Scale)	
	R2 (Upcoming Techniques)	
	Initial 2	After phase II
Mean	1.98	1.48
S.D.	0.244	0.327
Number	30	30
Maximum	2.54	1.81
Minimum	1.72	0
Range	0.82	1.81
Mean Difference	0.50	
Paired T Test	9.279	
P value	<0.001	
Table Value at 0.05	2.05	
Result	Significant	

Table 5: Describes the mean and standard deviation of improvement of group A in Phase I and Phase II that significantly changed from 0.53 to 1.22 and 0.395 to 0.669 significantly.

Paired T Test	Group A (Patient Specific Activity Scoring Scheme)	
	Improvement in	
	Phase I	Phase II
Mean	0.53	1.22
S.D.	0.395	0.669
Number	30	30
Maximum	1.2	2.6
Minimum	-0.4	-0.6
Range	1.6	3.2
Mean Difference	0.69	
Paired T Test	5.059	
P value	<0.001	
Table Value at 0.05	2.05	
Result	Significant	

Table 6: Describes the mean and standard deviation of improvement of group B in Phase I and Phase II that significantly changed from 0.14 to 0.50 and 0.149 to 0.297 significantly.

Paired T Test	Group B (Boston Scale)	
	Improvement in	
	Phase I	Phase II
Mean	0.14	0.50
S.D.	0.149	0.297
Number	30	30
Maximum	0.37	1.72
Minimum	-0.19	0.09
Range	0.56	1.63
Mean Difference	0.36	
Paired T Test	5.437	
P value	<0.001	
Table Value at 0.05	2.05	
Result	Significant	

Discussion

Dental professionals are amongst the most target group for repetitive stress injury such as Carpal Tunnel Syndrome because of the repetitive movement of the wrist during. Alessia Genova and Olivia Dix stated that Stage II Carpal Tunnel Syndrome occurs when the patient engages in a repetitive activity involving the hand or wrist or when a specific position is maintained for extended periods such as when dentists are doing their dental procedures such as canal cleaning and exfoliation.as stated by Valachi certain dental procedures such as biomechanical shaping of the root canals, constant use of ultrasonic scalers, Urmi Parmar and Krupa

Soni in a study stated that Carpal Tunnel Syndrome is most often seen in age group between 25-45 years and so is the age group of the present study. There are variety of treatment options available to treat Carpal Tunnel Syndrome. Manual therapy techniques such as Reflexology seem to be very effective in relieving symptoms caused by Repetitive wrist movements as described by Yani Shivachev. This technique also reduces the risk of exacerbation of local neuropathic pain and also avoids eventual side effects caused by unconventional medicine.Carpal mobilization technique as stated by Thomas R. Mehner and Faten Ismail resulted in substantial improvement of Visual analog scale and Function severity scale in patients having Carpal Tunnel Syndrome. Another study by A.Tal-Akabi and A.

It is evaluated in the present study that Reflexology and Osteopathy resulted in significant improvement in functional capabilities of the dentists having Stage II Carpal Tunnel Syndrome as shown in table 5 and 6 of the study.

In another study by Ashraf Ramadan Hafez there was significant improvement of pain, range of motion of wrist flexion and extension and hand grip in a group that included nerve flossing techniques in combination with Ultrasonic therapy and Active range of motion exercises.

In another group being treated with deep friction massage (Cyriax mobilization) there was significant improvement of pain, range of motion of wrist flexion and extension due to using of deep friction massage, which modulates of the nociceptive impulses at the level of the spinal cord: "gate control theory".

It is evaluated that when compared to nerve flossing and Cyriax mobilization in the present study results showed significant improvement as shown in Table 1 and Table 2.

Urmi Parmar found that Boston Functional Status Scale showed a significant improvement in the post -treatment stage as compared to the pre- treatment stage. In this present study, Boston Scale and Patient specific activity scoring scheme were used to check improvement in phase I and phase II respectively.

It has been observed that though there was improvement in both groups i.e. in phase I and phase II when compared with initial assessment scores according to Patient specific activity scoring scheme and Boston scale but in phase II that involved Upcoming Manual therapy techniques results showed significant improvements in functional abilities of dentists having stage II Carpal Tunnel Syndromes as compared with phase I group that involved extinguishing manual therapy techniques as shown in tables 5 and 6 of this study.

Conclusion

This study concluded that Upcoming Manual Therapy Techniques i.e., Osteopathy and Reflexology showed better results in improving functional capabilities as compared with Extinguishing Manual Therapy Techniques i.e., Nerve flossing and Cyriax mobilization in dentists having Stage II Carpal Tunnel Syndrome. Though Extinguishing Manual Therapy Techniques also gave positive results but when same group of patients were treated with Upcoming manual therapy techniques their functional outcomes had improved more significantly.

Thus, we can conclude that Upcoming Manual Therapy Techniques should be brought into practise to improve functional abilities among patients suffering from Stage II Carpal Tunnel Syndrome.

Conflict of Interest: None

Source of funding: Self

Ethical Clearance: A written informed consent was obtained from the patient and the study was performed with the approval of ethical committee at Khalsa college Amritsar.

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