Original Research

To Study the Impact of Wrist Splints and Nerve Tendon Gliding Exercises on Carpal Tunnel Syndrome in Women who Work at Computers and in Women Who Do Not

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Abstract

Background: To study the difference between the effects of wrist splint and nerve tendon gliding exercises for carpal tunnel syndrome in women with computer desk job and the difference between the effects of wrist splint and nerve tendon gliding exercises in non computer desk job women with carpal tunnel syndrome.

Methods: 34 Females objects with symptomatic carpal tunnel syndrome were selected randomly with age group between 25-30 years with due consideration to inclusion and exclusion criteria. In this study 34 subjects are selected. They were randomly divided into two groups using lottery method. In group A (Non Computer desk job women) wrist splint& Exercises was given. In group B (Computer desk job women) Nerve tendon gliding technique & exercises was done for 6 weeks. The beneficial effect of gliding exercises may be the mobilization of the nerve directly or facilitation of venous return or oedema dispersal. The pressure in the carpal tunnel is lowest in neutral wrist flexion extension range, with the pressure rising significantly as the wrist is moved into flexion or extension. Splint with the wrist in a neutral position, at night and during the day is used for starting 3 weeks and any at night during rest of period. Analyzing scores after 6 weeks the mean and SD values for pre and post FSS Sores of group A were 27 &21. 64 and 1.36 & 1.80 respectively.

Conclusion: The study showed that there was decrease in the pain and improvement in the functional ability statistically in carpal tunnel syndrome women with computer desk job by performing nerve and tendon gliding exercises and wrist splinting for both the groups for a period of 6weeks. This concluded that there was equal improvement in pain in both the groups but the functional ability is more improved after the nerve and tendon gliding exercises in group B. Therefore this study is rejecting the null hypothesis and accepts the alternate hypothesis.

Key Words: Carpal Tunnel Syndrome, Nerve Tendon Gliding, Functional Status Scale, VAS

Introduction

Carpal tunnel syndrome (CTS) is defined as median nerve dysfunction due to compression at the level of the carpal tunnel. Patients experience pain, numbness and motor weakness in median distribution, and a burning sensation in the hand extending up the forearm into the neck and shoulder.[2]. CTS occur as the symptoms manifested when the median nerve, the major sensory and motor nerve of the hand, becomes compressed as it travels from

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the forearm to the hand through the carpal tunnel. To best understand this syndrome, the anatomy of the carpal tunnel and the median nerve, along with the factors that lead to median nerve compression should be well understood.[3.4.5.]

Carpal tunnel syndrome is a painful hand and arm condition caused by compression of a nerve in wrist bones (carpal bones) and a ligament (transverse carpal ligament). The median nerve and several tendons passes through the carpal tunnel from the forearm to the hand. Sitting in front of desk all day can make you more prone to carpal tunnel syndrome because all the extra fluid you retain can put pressure on that nerve. It occurs most frequently in the second trimester but can develop at any time. CTS is typically bilateral and occurs commonly in relatively older women (mean age of 30 years), who are square wristed, nulliparous, or suffer with generalized oedema.[6] CTS is caused by factors that increase pressure on the median nerve, causing entrapment of the nerve, or in extreme cases, ischemia of the median nerve. Carpal Tunnel Syndrome is more frequent when women keep on sitting on the chair for longer duration because the systemic process increases the extra capsular fluid retention by the hormone Prolactin and produce soft tissue swelling in the later stages. The Carpal Tunnel Syndrome can thus be produced by compression or swelling of the median nerve in its synovial sheath. The exercises relieve pressure on the median nerve and stretch the carpal ligaments, which also helps decrease pressure. They are also thought to help blood flow out of the carpal tunnel, which can help decrease fluid pressure.[15.16.17.18]

The pressure in the carpal tunnel is lowest in neutral wrist flexion extension range, with the pressure rising significantly as the wrist is moved into flexion or extension. Splints that hold the wrist in neutral are often helpful in controlling symptoms of mild in moderate severity. They can be particularly useful in cases of early carpal tunnel syndrome, when the patient is repeatedly woken at night by painful paraesthesia splinting the wrist in this position, places the carpal tunnel in its most open position, allowing for restoration of maximal circulation to the median nerve. Further compression to the median nerve with prolonged wrist flexion while sleeping, or during daily/occupational activities are prevented with the use of a wrist splint. For optimal effect splints should be chosen and fitted by experienced hand therapists from a range of available options, with the opportunity for further visit to audit outcome and allow for additional adjustments.[22]

Nerve tendon gliding exercises are also seen to be effective with carpal tunnel syndrome. Neural gliding is a treatment technique that may improve symptoms related to CTS. Sometimes referred to as "neural flossing' or "neurodynamic mobilization," the technique of neural gliding is movement based and attempts to take the nerve throughout the available range of motion, potentially affecting the nerve both mechanically and physiologically. These exercises are thought to relieve pressure on the median nerve and stretch the carpal ligaments, which also helps decrease pressure. They are also thought to help blood flow out of the carpal tunnel, which can help decrease fluid pressure. [19,20,21,22]

Materials and Methods

34 Females objects with symptomatic carpal tunnel syndrome were selected randomly with age group between 25-30 years with due consideration to inclusion and exclusion criteria. Study area of our research was CIMS Bhopal. All patients presented with symptoms of median nerve compression with mild to moderate symptoms. They were electro-physiologically confirmed with CTS. All subjects fill the consent form and a brief demonstration was given about wrist splinting and tendon and nerve gliding techniques for the patient. They were randomly divided into two groups using lottery method. In group A (Non Computer desk job women) wrist splint & exercises was given. In group B (Computer desk job women) Nerve tendon gliding exercises was done for 6 weeks.

Wrist Splint was given for neutral-angle initiated at 24weeks of gestation. Bilateral splints were applied throughout the day and night for 3 weeks and then nocturnally for the remainder of duration. Length of time for splint use may also be determined by the causes of the individuals CTS's and their response to treatment. For example, a patient demonstrating CTS symptoms during pregnancy may only require splinting during this time.[26]While for nerve tendon gliding exercise, Tendon gliding and median nerve

gliding exercises are two types of exercises that may help with carpal tunnel syndrome.

Fist Flexion Exercises

Fist flexion Exercises (also known as tendon gliding exercises) move your fingers through five positions while your wrist stays in a neutral position (meaning it is not bend).

Exercise performed by:

1. Start with your fingers straight.

2. Make a hook fist and then return to a straight hand.

3. Make a straight fist and then return to a straight hand.

4. Make a full fist and then return to a straight hand.

Hold each position for seven seconds and do 10 repetitions. Repeat three times a day.

Median Nerve Gliding Exercises

For median nerve gliding exercises move out thumb through 6 positions while your wrist stays a neutral position. To perform the exercise:

1. Begin by making a fist with your wrist in the neutral position.

2. Straighten your fingers and thumb.

2 Bend your wrist back and move your thumb away from your palm.

4 Turn your wrist palm up,

5. Use your other hand to gently pull out thumb farther away from your palm. Hold each position for seven seconds, and do five repetitions. Repeat three times a day.

Effectiveness of the Tendon and nerve gliding exercises used as conservative treatment approached in relieving the symptoms of the carpal tunnel syndrome. (Lamia Pinar, Asgel Enhos, et.al,)

Ergonomic education: Repetitiveness of work tasks, and poor posture during repetitive tasks are commonly cited risk factors for the development of CTS. (Asdiscussed above, during the assessment of these patients, occupational tasks and the patient's posture during these activities should be identified.) Ongoing education should include avoidance of wrist postures (i.e., prolonged wrist flexion), repetitive wrist motions such as gripping or pinching objects while flexing the wrist, and performing repetitive wrist flexion-extension exercise motions. It is important to evaluate the work environment and to suggest alternatives such as ergonomically designed workstations designed to limit postural stresses.[23]

Patients were assessed at the baseline and at the end of treatment session after Six weeks with functional status scale (FSS) & VAS

Results and Discussion

The paired and unpaired t test is used for analysis. However few limitations were observed in this study like monitoring of wrist splint wearing is not done in home, other interventions like carpal mobilization can be compared with neural mobilization etc. Thus after analysing all the data of group A&. B after 6 weeks it suggests that both groups shows equal improvement in VAS scores and thus in pain level but group B shows more significant improvement in Functional status then compared to group A.

Carpal Tunnel Syndrome (CTS) is defined as median nerve dysfunction due to compression at the level of the carpal tunnel. The primary aetiology is varied but idiopathic form is the most common. Occupational women are also susceptible canal tunnel syndrome even if they do not type or play music all day. CTS are common in working women with desk job and is considered to have a short and benign course.[1] Working on computers can make you more prone to carpal tunnel syndrome because all the extra fluid you retain can put pressure on that nerve. It occurs most frequently while working on desk job but can develop at any time. CTS is typically bilateral and occurs commonly in relatively older women (mean age of 30 years), who are square wristed, nulliparous, or suffer with generalized edema.[6] CTS can also be seen may be due to fluid retention by the hormone, prolactin. Symptoms may include numbness, tingling, pain, or a dull ache in the fingers, hand, or wrist. These symptoms tend to come and go and are often worse at night. Occasionally, the discomfort may even extend to the forearm and upper arm. Symptoms of median nerve compression include pain, numbness or tingling on the anterior surface of the index, middle or radial half of the

ring finger. It is often associated with weakness of handgrip or nocturnal symptoms including hand or arm pain and numbness. Symptoms are often worse at night and can be exacerbated by forceful activity and extreme wrist positions.[26]Thesymptoms resolve after delivery in most women with pregnancy related carpal tunnel syndrome.[34] Treatment of CTS depends on the severity of symptoms.**Ante Jurjevicet, all**, studied on Early Onset of Carpal Tunnel Syndrome: Case Report, Conservative treatment was sufficient for symptom relief in this case, which is in accordance with other reports of complete improvement achieved by conservative therapy.

Paired't' test was used the p values <0.0001 considered extremely significant, the t value 15.71 which shows significant improvement in functional status after6weeks. The mean and SD values or pre and post VAS scores of group Aare 7.94 & 3.41 and 0.74 and 0.93respectively. Paired 't' test was used the p value <0.0001 considered extremely significant, the t value 18.53 which shows significant improvement in pain after 6 weeks. The mean and SD values for pre and post VAS scores of group B were 7.94 & 3.47 and 0.82 & 1.06 respectively. Paired 't' test was used the p value <0.0001 considered extremely significant, the t value 15.63 which shows significant improvement in pain after 6 weeks. The mean and SD values for pre and post FSS scores of group B were 27.05 & 14.70 and 0.96 & 1.64 respectively. Paired 't' test was used the p value <0.0001 considered extremely significant, the t value 26.32 which shows significant improvement in functional status after 6 weeks.

When compared the mean and SD values for post VAS scores of group A and group B were 3.4 & 3.47 and 0.93 & 1.06 respectively. Unpaired 't' test was used the p value =0.86 considered not significant, the t value 0.17, which shows equal improvement in pain for both the groups after 6 weeks. The mean and SD values for post FSS scores of group A and group B were 21.64 & 14.70 and 1.80 & 1.64 respectively. Unpaired 't' test was used the p value <0.0001 considered extremely significant, the t value 11.72.

The outcome measure of all two groups are taken by at first day of study and end day of the study i.e.,6 weeks by using visual analogue scale and functional status scale after this the analysis was done by Instate software. The paired and unpaired t test is used for analysis. However few limitations were observed in this study like monitoring of wrist splint wearing is not done in home, other interventions like carpal mobilization can be compared with neural mobilization etc.

Thus after analysing all the data of group A &. B after 6 weeks it suggests that both groups shows equal improvement in VAS scores and thus in pain level but group B shows more significant improvement in Functional status then compared to group A.

Conclusion

The study showed that there was decrease in the pain and improvement in the functional ability statistically in carpal tunnel syndrome during pregnancy by performing nerve and tendon gliding exercises and wrist splinting for both the groups for a period of 6weeks. This concluded that there was equal improvement in pain in both the groups but the functional ability is more improved after the nerve and tendon gliding exercises in group B.

Ethical Clearance: This study was approved by our institutional ethical committee. Institutional Ethics Committee, Career College, Bhopal, Approval Date: 11/01/2023, Approval/Reference Number: CC/BPT/22/292. Written informed consent was obtained from all participants prior to their inclusion in the study.

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