A Study to Compare the Effectiveness of Strengthening Exercises and Nerve Mobilization Techniques for Tarsal Tunnel Syndrome among Pregnant Women

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Abstract

Background: The tarsal tunnel syndrome is an entrapment neuropathy of the medial ankle. Most common symptoms are pain, burning, tingling sensation in the sole of the foot. The purpose of this study is to find the effectiveness of strengthening and nerve mobilization on tarsal tunnel syndrome among pregnant women.

Purpose: The purpose of the study is to determine the effectiveness of strengthening exercises and nerve mobilization techniques for tarsal tunnel syndrome among pregnant women

Material And Method: The study was performed on 274 women age up to (21-30) year and collected from revival physio care centre on the basic requirements like age, height, education and weight for women and their questionnaires are used to test tarsal tunnel syndrome. The study period was June 2022 to Jan 2023

Results: Pre test and post test values were analysed. Results suggest that strengthening with ultrasound group has significant improvement in compared with nerve mobilization group with P value < 0.0001.

Conclusion: Study concluded that Strengthening exercise is more effective than nerve mobilization in terms of pain level and tenderness

Keywords: Tinel’s test, Tibial nerve stretch test and ultrasound.

Introduction

Tarsal tunnel syndrome (TTS) is an entrapment neuropathy of the posterior tibial nerve or its branches within its fibro-osseous tunnel beneath the flexor retinaculum on the medial side of the ankle.1 It is a rare but important condition which is regularly under-diagnosed leading to a range of symptoms affecting the plantar aspect of the foot.2 There are several important structures in the tarsal tunnel.3 It contains the posterior tibialis tendons, as well as the flexor digitorum longus and flexor hallucis longus muscle.4 It contains the posterior tibial artery and
vein, as well as the posterior tibial nerve (L4 -S3). It's important to note how these structures are arranged within the tarsal tunnel.

Tarsal tunnel syndrome has two different aetiologies: intrinsic and extrinsic. Generalised lower extremity edema, ill-fitting shoes, trauma, post-surgical scarring, inflammatory arthropathies and diabetes are extrinsic factors. Tendinopathy, tenosynovitis, osteophytes, and space-occupying lesions are examples of intrinsic causes. Varicosities, pedal edema, ligament laxity, and arch drop have all been associated with pregnancy.

Tarsal tunnel syndrome is diagnosed with the help of special test; tinel’s sign, dorsiflexion – eversion test, tibial nerve stress test, high frequency ultrasonography (HF-USG), ROM, MMT. The pathogenesis of tarsal tunnel syndrome determines conservative treatment.

Pain, inflammation, and tissue stress should be reduced. Rest, ice, physical therapy, balance exercises and NSAIDS can help to relieve pain nerve gliding. Biomechanical anomalies can be corrected by orthotic shoes, which offload the tarsal tunnel. Inverting the heel, a medical heel wedge or heel seat might lessen traction on the nerve.

Nerve mobilization technique is used to help people recover from injuries or improve their performance in activities. It enhances the strength and nerve mobilization also showed a positive effect for decrease in tinel sign and 2-point discrimination, sensory loss. Strengthening exercises for tarsal tunnel syndrome include tibialis posterior strengthening, the function of the tibialis posterior muscle is to stabilize the ankle, also for inversion of the ankle. These can be done with the help of theraband or towel. It can be done by weight bearing and also by non-weight bearing. Heel raise, arch lift, single leg balance, single leg calf raise are the common strengthening exercises for tibialis posterior muscles.

**Aim**

The aim of the study is to determine the effectiveness of strengthening exercises and nerve mobilization techniques for tarsal tunnel syndrome among pregnant women.

**Material and Method**

This is a quasi experimental study done with 274 subjects with diabetic peripheral neuropathy, aged between 21-30 years, pregnant women from a private hospital from chennai. Samples were selected and allocated in a single group.

**Inclusion Criteria:**
- Tinel’s sign positive
- Tenderness grading more than 2
- Pregnant women age 21-30 years

**Exclusion Criteria:**
- Past history of fracture of injury
- Subject with other neurological disorders
- Recent surgeries in lower limb

**Outcome Measure:**
The study were taken from pregnant women with having tinel sign positive (for 8 weeks)
- Tenderness grading scale.

**Procedure**

The observation study was conducted in revival of physiocare (physiotherapy and rehabilitation clinic) no 1, anthonyiar street, charles nagar, pattabiram , chennai - 600072 Tamil nadu, India the study was performed on 274 pregnant women upto (collect the with 21-30 year basic requirements like name, age etc for pregnant women were recorded and their questionnaire were used to the tarsal tunnel syndrome are to noted to the pregnant women pain over the ankle for two weeks, tingling or numbness pain over the foot.

These are noted for the pregnant women and tenderness grading scale (grade 1- Patients complains of pain, grade 2- patients complains of pain and winces, grade 3- patients winces and withdraws the joint, grade 4- patients will not allow palpation of the joint). and tinel signs are detect with this tenderness grading scale are used to find out the tarsal tunnel syndrome of pregnant women.
Study was conducted on 274 participants with Tarsal tunnel syndrome using convenience sampling techniques based on inclusion and exclusion criteria. The study was explained to subjects and written consent was obtained from the subjects. The participants were split into 2 groups, group A-137 and group B-137.

Group A was treated with strengthening exercises. Group B was treated with nerve Mobilization. Both treatment programs were given for 4 weeks, 10 repetition, 5 days per week and 2 session per day with one minute rest period in each set.

**Strengthening Exercises (Ultrasound) Group:** Group A with 137 samples were treated with strengthening exercise along with ultrasound for tarsal tunnel syndrome. The patient was instructed to rest in a supine position. The area other than the treatment are covered. The subjects were given ultrasound with strengthening exercises for a time duration of 10 minutes in a session for a total of 3 days in a week continuously up to 4 weeks.

**Mobilization Group:** Group B with 137 samples was given a nerve mobilization technique for tarsal tunnel syndrome. These were instructed to the patients. The patient was instructed to rest in a supine.

- **Tinel Sign:** place the patient’s foot into full Dorsiflexion and eversion and hold for 5-10 seconds the results are that it elicits the patient’s symptoms are checking for the Tarsal tunnel syndrome patient
- **Ultrasound:** ultrasound are given to patient with the Duration -10 min, mode-continues and intensity -2.0 W/m2. And strengthening exercises are given to the patient
- **Nerve Mobilization Techniques:** Nerve mobilization techniques patient in supine position. One hand on foot and another hand on feet and gentle pressure applied to the patient and it’s called posterior Gliding compressor
- **Strengthening Exercise:** patient assisted them do dorsiflexion and plantar flexion movement using theraband.

**Data Analysis**

Graph-1: Comparison of pre and post-test of Group-A strengthening with ultrasound.

Graph-2: Comparison of Pre and Post-test of group B (nerve mobilization techniques)

Group A and B Unpaired T-test

Graph-3: Comparison of post-test values of both group-A and groupB (strengthening exercises with ultrasound and nerve mobilization techniques)
Result

To analyze the data, descriptive and inferential statistics were used. As a result, the parameters mean and SD were employed in student t test to look for major differences among the pre-test and post-test measurements. A statistically significant difference between Groups was discovered by analyzing quantitative data.

Graph 1 compares the pre- and post-test value of strengthening exercise using tenderness grading scale shows that pre-test values of 3.394(+0.20) were increased to 632(+0.16) in the post-test.

As a result, with a p value of <0.0001, this findings are judged statistically significant.

Graph 2 compares the pre- and post-test values of nerve mobilization techniques using tenderness grading scale shows that pre-test values of 1.488(+0.164) were increased to 2.628(+0.234) in the post-test.

As a result, with a p value of <0.0001, the findings are judged statistically significant.

Graph 3 compares post-test values of strengthening exercise and nerve mobilization using tenderness grading scale, shows that strengthening exercise values of 4.632(+0.163) whereas values of nerve mobilization 2.628(+0.234). The results are statistically significant with a p value of <0.0001.

Discussion

According to the inclusion criteria, this study was done on 274 volunteers between the ages of 21-35, who were randomly separated into two groups (strengthening exercise and nerve mobilization). The outcome measures were assessed at the conclusion of the second week using the tenderness grading scale.

The tenderness grading values of strengthening exercise, showing that the pretest values of 3.39(+0.20) in strengthening exercises before intervention. The mean value of the tenderness grading scale increased to 4.632(+0.16) in the post-test.

The tenderness grading scale values of nerve mobilization, showing the pretest values of 1.48(+0.16) in the experimental group before intervention. The mean value of the tenderness grading scale increased to 2.62(+0.234) in the post test.

According to statistical analysis, both strengthening exercise and nerve mobilization groups improved their tenderness grading scale scores. When the two groups were compared at the end of two weeks, the patient in the strengthening exercise group, who received strengthening exercise with ultrasound improved more in the tenderness grading scale than the subjects in the nerve mobilization group.

Conclusion

This study provides evidence supporting the effectiveness of strengthening exercises as a management strategy for tarsal tunnel syndrome. The findings demonstrate significant improvements in pain level and tenderness following the intervention. Further research and long-term follow-up studies are necessary to validate these results. Strengthening exercise is more effective than nerve mobilization, according to the findings.

Ethical Clearance: The research work has been approved by the ISRB committee. ISRBapplicationnumber- 03/090/2022/ISRB/SR/SCPT

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Conflict of Interest: No conflict of interest during this research.

References


