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EFFECTS OF TENDON NEUROPLASTICITY TRAINING AMONG BADMINTON PLAYERS WITH LATERAL EPICONDYLITIS – A QUASI EXPERIMENTAL STUDY

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Abstract

Background: Lateral epicondylitis, also known as “tennis elbow” is an overuse tendinopathy of the common extensor origin at the elbow due to repetitive movements of the wrist and forearm. The repeated motions and stress to the tissue results in injury of the tendons at the lateral epicondyle of the humerus. A normal Tendon is exposed to optimised load, which causes adaptation. An inappropriate load to the tendon or an unloaded tendon leads to stress shielding where normal loading or excessive loading provokes Tendinopathy. Tendon Neuroplasticity training involves strength training and external pacing, which helps in developing good motor control and sufficient muscle capacity to perform a task.

Materials and Method: In this study 24 Badminton players with tennis elbow were selected and divided into two groups Group A with 12 players underwent Conventional therapy and strengthening exercise and Group B with 12 players underwent Tendon Neuroplasticity training along with conventional physiotherapy for 4 weeks.

Results: The Statistical Analysis showed a significant reduction of Pain after Tendon Neuroplasticity Training (NPRS: $p < 0.05$;) and improvement in Hand Grip (Hand held dynamometer: $p < 0.05$;))

Conclusion: The study is concluded that Tendon neuroplasticity training along with conventional therapy reduces Pain and improves Hand grip strength

Keywords: Lateral Epicondylitis, tendon neuroplasticity training, pain, grip strength

INTRODUCTION

Lateral Epicondylitis (LE), otherwise "Tennis Elbow", generally overuse syndrome in the elbow (Cutts S et al., 2019). It affects approximately 4-7 per 1000 individuals. LE is an overuse injury which may results in hyaline degeneration at the common extensor origin. Overuse of the muscles and tendons of the forearm and elbow together with repetitive contractions adjoin too much strain on the extensor tendons which cause deformation in tendon structure that leads to pain in the lateral epicondyle. Predominantly, the pain is located anterior and distal from the lateral epicondyle (Pienimäki T, et al.,2002). Tendons have the ability to modify depending on which loads they are subjected to, Modification can occur not only at a structural level but also occur at a cortical level (Ahmad Z.,2013), which introduced a tendon rehabilitation protocol to address motor control deficits seen in patients with tendinopathy. Tendon neuroplastic training (TNT) refers to the combination of isometric or isotonic strength training secondary with an externally-paced audio or visual cue. Patients perform a strength training task that loads the affected tendon (Rio E et al.,2016).

HYPOTHESES:

Null Hypothesis (Ho1): There is no significant improvement in Pain with Tendon Neuroplasticity Training.

Null Hypothesis (Ho2): There is no significant improvement in Handgrip Strength with Tendon Neuroplasticity Training.

Null Hypothesis (Ho3): There is no significant improvement in Pain and handgrip with Tendon Neuroplasticity Training.

Alternate Hypothesis (Ha1): There is significant improvement in Pain and Handgrip Strength with Tendon Neuroplasticity Training.

Alternate Hypothesis (Ha2): There is significant improvement in Handgrip Strength with Tendon Neuroplasticity Training.

Alternate Hypothesis (Ha3): There is significant improvement in Pain and Handgrip Strength with Tendon Neuroplasticity Training.

MATERIALS AND METHOD

Study design: Quasi Experimental design

Procedure: Participants 24 badminton players at the beginner's stage (less than one year) were selected. All the players were selected with Lateral epicondylitis in under cultural stage and had Cozens test positive, were selected and divided into two groups Group A with 12 players undergoing Tendon Neuroplasticity training along with conventional physiotherapy and Group B with 12 players underwent conventional physiotherapy for 4 weeks. In this study only male players were selected.

Exercise Program

The exercise program was given for 4 weeks.

Conventional therapy and strengthening exercise

1) Patient in a high chair sitting with arm abducted forearm pronated resting above a pillow on a table.

2) Ultrasound was given under Pulsed mode for 8 minutes and ice pack for 10 minutes

Conventional therapy and Tendon Neuroplasticity Training

This training was done by providing an auditory cue through a metronome and the patient performs wrist extension with the

Thera loop and progressed to Dumbbell for 3 sets and 10 repetitions.

Statistical Tool: Paired and unpaired t test

RESULTS

The sample comprised of a total 24 badminton players with Lateral epicondylitis. The assessments were taken for 1) Pain by using NPRS, 2) Hand Grip by using hand-held Dynamometer. The Data analysis was done using data 't'test and unpaired 't'test and SPSS software v 22.0. The Statistical Analysis showed a significant reduction of pain after Tendon Neuroplasticity Training (NPRS: $p < 0.05$;) and improvement in Hand Grip (Hand held dynamometer: $p < 0.05$;) . The unpaired 't'test post test value are described in the table below.

| Outcome measures | Mean Value | | Calculated t-value | Table t-value | p-value |
|------------------|------------|---------|--------------------|---------------|---------------------------|
| | Group A | Group B | | | |
| NPRS | 2.00 | 1.67 | 12.53 | 1.717 | $P < 0.05$ is significant |

Table 1: Post test values for pain

| Outcome measures | Mean Value | | Calculated t-value | Table t-value | p-value |
|--------------------|------------|---------|--------------------|---------------|---------------------------|
| | Group A | Group B | | | |
| Hand grip strength | 70.00 | 80.83 | 3.0262 | 1.717 | $P < 0.05$ is significant |

Table 2: Post test values for Hand grip strength

DISCUSSION

Tendinopathy can be resistant to treatment and frequently recurs, implying that current treatment approaches are suboptimal. Rehabilitation programs that have been successful in terms of pain reduction and return to sport outcomes generally include

strength training (Rio E et al., 2016). Tendon neuroplastic training is a strength training technique that address the central nervous system involvement of tendinopathies. Combining resistance exercise with metronome- based training can potentially enhance the tensile capacity of the tendon and reduce motor control deficits (Cutts S et al., 2019).

The studies shows that ultrasound provides reduction in pain over one to three months. Ultrasound should be done two or three times per week with a duration of four to six weeks (Rio E et al., 2016). Physical examination tests' individual accuracy has been under- researched but available evidence suggests that the Cozen's test reported high perceptivity and concluded that the Cozen's test can be used to rule out side epicondylitis during a physical examination, and that the grip strength difference between elbow flexion and extension has good individual values for determining the presence and absence of side epicondylitis (Karanasios. S et al., 2022). A resisted wrist extension was performed to target the extensor carpi radialis brevis, as this accounts for 90 of side elbow tendinopathies (Bhabra, G et al., 2016). Externally paced resistance training, similar as with the use of a metronome, is able of inducing ipsilateral and contralateral changes to the excitability and inhibition in healthy participants.

Tendon neuroplastic training (TNT) refers to the combination of isometric or isotonic strength training secondary with an externally-paced audio or visual cue. Patients perform a strength training task that loads the affected tendon which adequately address both the deficits in tendon strength and motor control seen in tendinopathy (Patrick Welsch et al., 2018)

CONCLUSION

The study is concluded that Tendon neuroplasticity training along with conventional therapy reduces Pain and improves Hand grip.

LIMITATIONS

- 1) Study sample size was small
- 2) Only Badminton players were selected
- 3) Only Male players were selected

CONFLICT OF INTEREST

No Potential conflict of interest relevant to this article was reported

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