

## Effect Of Dry Needling Therapy with IASTM on Spasticity in Neurological Conditions

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### ABSTRACT

**Background:** The purpose of this study is to evaluate how well dry needling therapy with IASTM affects spasticity in neurological disorders. It is predicted that using IASTM and dry needling will greatly lessen pain and spasticity and help those who are impacted have more toned muscles.

**Methodology:** A 12-month experimental study was carried on total of 60 neurological patients ( $\geq 40$  years old) who had spasticity in neurological disorders had IASTM and dry needling therapy three times a week for 45 minutes each session for 2.5 months. VAS and MAS were used to measure pain and spasticity.

**Results:** Participants' muscle tone improved statistically significantly ( $p < 0.05$ ) between pre- and post-intervention ratings, according to paired t-test analysis. A statistically significant improvement ( $p < 0.05$ ) was observed in both spasticity and pain levels when comparing pre-test and post-test results among participants.

**Conclusion:** By enhancing proprioception and muscular relaxation, dry needling and IASTM assist neurological patients experience less spasticity.

**Keywords:** Dry Needling therapy, IASTM, Neurological condition, Modified Ashwarth Scale, Visual Analogous Scale.

### 1. INTRODUCTION

Neurological problems include a wide range of illnesses that can impact the brain, spinal cord, peripheral nerves, and neuromuscular junctions, and among other parts of the nervous system. These disorders may result from infections, autoimmune reactions, degenerative processes, severe injuries, vascular problems, or genetic abnormalities<sup>1</sup>. Depending on the particular region and function of the nervous system, there are numerous neurological conditions, like multiple sclerosis (MS), stroke, Parkinson's disease (PD), and various additional neurological diagnoses. Spasticity is usually linked to reduced mobility, challenges in activities of daily living (ADL), and diminished quality of life (QOL)<sup>2</sup>. The widely acknowledged definition of spasticity is "a motor disorder characterized by a velocity-dependent increase in tonic stretch reflexes with

exaggerated tendon jerks, resulting from hyperexcitability of the stretch reflex. Spasticity varies from being a clinical sign with no functional impact to being a gross increase in tone interfering with mobility, transfers and personal care. Untreated, it can cause shortening of muscles and tendons, leading to con-tractures. One of the most prevalent conditions among traumatic brain injury (TBI) sufferers is spasticity, affecting as many as 20% of individuals with moderate-to-severe TBI. An acute subdural hematoma, which may occur in up to 20% of individuals with TBI, can be linked to contralateral spastic hemiplegia, a lesion with physiopathology kin to that of vascular-origin brain lesions<sup>5</sup>. According to WHO, stroke was the second biggest cause of death globally with two-thirds of those deaths occurring in less developed nations<sup>3</sup>. Following spinal cord injury (SCI), chronic pain and stiffness are frequent clinical symptoms that negatively affect quality of life <sup>7</sup>. Alternative methods like Dry Needling (DN) have been employed recently to treat spasticity<sup>9</sup>. To stimulate the underlying neuronal, muscular, and connective tissue, <sup>8</sup> Instrument Assisted Soft Tissue Mobilization (IASTM) is a specialized myofascial technique believed to be founded on the principles of James Cyriax. In contrast to the Cyriax approach, which employs digital cross friction, IASTM uses specially crafted tools to deliver soft-tissue massage or mobilization. It is believed that using the instrument gives clinicians a mechanical advantage by enabling deeper tissue penetration, providing vibration feedback, and allowing for more targeted treatment, all while minimizing stress on their hands.<sup>10</sup> The present study was designed to evaluate the impact of IASTM therapy and dry needling on spasticity in neurological diseases.

## 2. METHODOLOGY

An experimental interventional type of study was conducted in the Department of Neurology at Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, with in a duration of 12 months. The present study has been approved from Institutional Ethical Committee (PMU/PMCH/IEC/2024/294). This study has enrolled a total of 60 patients of either gender with age group of  $\geq 40$  years and had neurological disorders with spasticity. Enrolled sixty patients with spasticity in neurological conditions (experimental group) have been enrolled in this study followed by intervention/ treatment of IASTM therapy and dry needling treatment session of 45 minutes for three times a week. The present study measured the MAS score for spasticity during movement and used VAS for discomfort. Participants who were allergic to IASTM or dry needling, or who had any other sensitive diseases, were not allowed to participate in this study. Prior to enrolment, both verbal and written consent were obtained. Confidentiality of the patients was preserved.

## 3. RESULTS

**Table-1: Baseline descriptive analysis of variables**

| GROUPS              | CHARACTERISTICS (Mean $\pm$ SD)  |
|---------------------|----------------------------------|
| No. of Subjects (N) | 60                               |
| Age (years)         | 57.87 $\pm$ 11.8                 |
| Diagnosis           | Multiple Sclerosis: 5 (8%)       |
|                     | Spinal cord injury: 1 (2%)       |
|                     | Stroke: 44 (73%)                 |
|                     | Traumatic Brain Injury: 10 (17%) |
| Gender              | Female: 20 (33%)                 |
|                     | Male: 40 (60%)                   |

**Table 2: Comparison of Pre and Post treatment score or Spasticity Based on MAS**

| MODIFIED ASHWORTH SCALE |                      |                             |                |         |         |             |
|-------------------------|----------------------|-----------------------------|----------------|---------|---------|-------------|
| Outcome Measures        | Pre-Test (Mean ± SD) | Post (Immediate (Mean ± SD) | - Test Effect) | W Value | P Value | REMARKS     |
| Spasticity              | 1.86 ± 0.23          | 1.16 ± 0.27                 |                | - 6.56  | <0.001  | Significant |

**Table 3: Comparison of Pre and Post treatment score for Pain Based On VAS**

| VISUAL ANALOGOUS SCALE |                               |                                              |         |         |             |
|------------------------|-------------------------------|----------------------------------------------|---------|---------|-------------|
| Outcome Measures       | Pre - Test<br>(Mean $\pm$ SD) | Post - Test<br>(Immediate<br>(Mean $\pm$ SD) | W Value | P Value | REMARKS     |
| Pain                   | 6.68 $\pm$ 1.35               | 3.3 $\pm$ 1.23                               | - 6.56  | <0.001  | Significant |

#### 4. DISCUSSION

Spasticity characterized by increased muscle tone, spasms, hyperreflexia, clonus, and occasional contractures is a hallmark of **upper motor neuron syndromes**. It frequently arises in conditions such as stroke, TBI, SCI, MS, varying in prevalence from roughly one-third to over 90%, depending on the condition.<sup>11</sup>

The present study enrolled a total of 60 patients with neurological conditions associated with spasticity. These patients were evaluated to assess the pre- and post-treatment effects of IASTM and DN therapy. The neurological diagnoses included stroke, traumatic brain injury (TBI), multiple sclerosis (MS), and spinal cord injury (SCI). Participants were classified based on their specific diagnosis. Stroke was the most common condition, with 73% cases, followed by TBI (17%) and MS (8%), while SCI (2%) accounted for a minimal number of cases.

In patients with neurological conditions, Instrument-Assisted Soft Tissue Mobilization and Dry Needling therapy were evaluated for their effects on key clinical parameters such as pain and muscle tone. The findings of the present study align with existing literature, as several previous studies have reported favorable outcomes regarding the reduction of pain and improvement in muscle tone following these interventions. The mean age of the study population was  $57.87 \pm 11.8$  years, comprising 67% males and 33% females (Table 1).

Myeong-Jun Kim et al. conducted a study on 26 stroke patients with spasticity to evaluate the effects of Instrument Assisted Soft Tissue Mobilization and Neurodynamic Treatment (NYDT) over a six-week period. Participants were randomly divided into two groups: an experimental group receiving IASTM (n = 13) and a control group receiving NYDT (n = 13). Muscle tone and stiffness were assessed using the Modified Ashworth Scale (MAS) and the Mini-Mental State Examination (MMSE). The MAS was specifically used to evaluate tone in three muscles: tibialis anterior (TA), gastrocnemius medialis (GM), and semitendinosus (ST). In the experimental group, pre-treatment tone scores were 19.63 for TA, 14.2 for GM, and 15.66 for ST. After six weeks of treatment, the scores decreased to 18.24 for TA, 14.22 for GM, and 13.93 for ST, indicating a reduction in muscle tone following IASTM therapy.<sup>12</sup>

In contrast, the present study also evaluated muscle tone using the Modified Ashworth Scale (MAS) within a single experimental group, comparing pre- and post-treatment scores. The mean MAS score before treatment was  $1.86 \pm 0.23$ , which significantly decreased to  $1.16 \pm 0.27$  after the intervention (Table 2, Graph 2). These findings indicate a notable reduction in spasticity, suggesting that the applied therapeutic approach was effective in decreasing muscle tone in patients with neurological conditions.

María del et al. carried out a study in which 12 patients in all were divided into one experimental group. Dry needling therapy's impact on pain and impairment in MS patients was assessed in this study. The Visual Analogue Scale (VAS) was used to measure pain levels both on the first day of treatment and again after a four-month intervention period. With the mean VAS score dropping from 4.0 at baseline to 0.91 after treatment, the results demonstrated a significant decrease in pain, demonstrating the efficacy of dry needling in treating pain in MS patients.<sup>13</sup>

Similarly, in our study involving a single experimental group, pain was assessed by using the Visual Analogue Scale both before and after treatment. The mean pre-treatment VAS score was  $6.68 \pm 1.35$ , which significantly decreased to  $3.3 \pm 1.23$  following the intervention (Table 3, Graph 3). These findings suggest that the use of dry needling therapy in patients with neurological conditions is effective in reducing pain intensity.

The present study also evaluated the relationship between the Modified Ashworth Scale (MAS) and the Visual Analogue Scale (VAS) in both pre- and post-treatment assessments. The analysis revealed no significant association between muscle tone (MAS) and pain intensity (VAS) at either time point.

## 5. CONCLUSION

This study suggests that combining dry needling therapy with Instrument-Assisted Soft Tissue Mobilization (IASTM) may be an effective treatment approach for reducing spasticity in neurological conditions, as measured by the Modified Ashworth Scale.

The use of Visual Analogue Scale (VAS) indicates potential benefits for pain management.

The present study may lead to optimization of treatment protocols for managing spasticity and pain in neurological conditions.

This treatment combination may offer a valuable adjunct therapy for patients with neurological conditions, enhancing their quality of life.

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