

Immediate Effect of Instrument Assisted Soft Tissue Mobilization (Iastm) On Upper Limb Spasticity in Stroke Patients: A Pilot Study

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ABSTRACT

Background: Stroke is a quickly growing clinical manifestation of localised brain function disruption that lasts for 24 hours or longer and has no obvious explanation other than vascular origin. The onset of Spasticity is highly variable in the post-stroke period. Instrument Assisted Soft Tissue Mobilization (IASTM) is a revolutionary fascia and connective tissue therapy that enables therapists to effectively treat functional connective tissue diseases.

Aim of the Research: To evaluate the immediate effect of IASTM with conventional therapy on upper limb spasticity in stroke patients.

Methodology: Twenty subjects were recruited according to inclusion and exclusion criteria. These subjects were randomly allocated into two groups (group A treated with conventional therapy and IASTM technique, group B treated with conventional therapy). Pre- and post-assessment of upper limb spasticity using the Modified Tardieu Scale (MTS) was done, followed by statistical analysis.

Result: pre and post scores of MTS by using paired t test which indicates there was significant improvement in GROUP-A ($P < 0.05$) and Comparison of post scores of both groups was done by using unpaired T- test which shows significant reduction in spasticity ($P = 0.00^*$).

Conclusion: IASTM shows significant reduction on upper limb spasticity in stroke patients

Keyword: STROKE, SPASTICITY, IASTM, MTS.

1. INTRODUCTION

Stroke is a quickly growing clinical manifestation of localised brain function disruption that lasts 24 hours or longer and has

no obvious explanation other than a vascular origin. Stroke is the leading cause of disability and death in the Country. India's adjusted stroke prevalence rate is 84–262/100,000 in rural regions and 334–424/100,000 in urban areas. ^[1]

Motor deficits on one side, discomfort, muscular weakness, abnormal tone, swallowing difficulties, altered synergy patterns, dysreflexia, incoordination, balance, postural concerns, and sensory disturbances are all prevalent clinical symptoms of stroke. ^[2]

Spasticity, also known as hypertonia, develops in 20-30% of stroke victims. ^[3] Spasticity is characterised by excessive tendon reflexes, greater resistance to passive movement, and hypertonia due to the absence of upper motor neuron inhibitory regulation. ^[4] The development of Spasticity in the post-stroke stage is highly diverse, with studies revealing that it develops and peaks at 1-3 months following stroke. ^[5] Upper extremity spasticity is more common than lower extremity spasticity. ^[4]

Spasticity is more common in upper-limb flexor muscles (fingers, wrists, and elbow flexors) than lower-limb extensor muscles (knee and ankle extensors). Wissel et al, found that spasticity developed most frequently in the elbow (79%), wrist (66%), ankle (66%), and shoulder (58%). ^[6]

Gradual extended and firm stretch, low frequency vibration to the agonist, firm inhibitory pressure on tendons, continuous contact, and slow stroking are some of the inhibitory techniques typically utilised for spasticity or contractures. ^[7]

To reduce spasticity, some manual techniques are utilised in conjunction with other physiotherapy treatments. Instrument Assisted Soft Tissue Mobilization (IASTM) is a modern fascia and connective tissue treatment that enables the therapist to treat functional connective tissue diseases effectively. It's a type of mechanotherapy that employs rigid devices constructed of various materials (steel, ceramic, jade, wood etc.) ^[8]

The inhibitory effect of IASTM on hyperactive Gastrocnemius activation was observed in a South Korean case study, which suggested a promising effect of neuromuscular imbalance between Tibialis Anterior and Gastrocnemius activation increasing gait function. Lee et al. treated the Gastrocnemius to IASTM in spastic patients to investigate the immediate effect on reciprocal inhibition and innervations. The Gastrocnemius muscle was shown to be less active, while the Tibialis anterior muscle was more active. ^[9]

2. METHODOLOGY

NEED OF THE STUDY:

- Hence, there is a scarcity of evidences on immediate effect of IASTM on spastic stroke patients. So, present study generates significant information about effect of IASTM.

AIM OF THE STUDY:

- To evaluate the immediate effect of IASTM with conventional therapy on upper limb spasticity in stroke patients.

OBJECTIVES OF THE STUDY:

- To study the pre and post effect of IASTM with conventional therapy on upper limb spasticity in stroke patients.
- To compare the post-effect of the control group versus the IASTM group on upper limb spasticity in stroke patients.

HYPOTHESIS:

NULL HYPOTHESIS (H0):

- There Is No Significant Reduction On upper limb Spasticity in Stroke Patients Treated with IASTM.

ALTERNATE HYPOTHESIS (H1):

- There Is Significant Reduction On upper limb Spasticity in Stroke Patients Treated with IASTM.

- **STUDY SITE:** Vadodara

- **STUDY POPULATION:** Stroke patients

- **PROPOSED SAMPLE SIZE:** The Sample Size Is 20 (10 In Each Group).

- **TYPE OF SAMPLING:** Convenient Sampling

- **STUDY DESIGN:** Pilot Study

- **INCLUSION CRITERIA:**

- 1st episode being diagnosed as unilateral stroke with onset period of 1 year.
- Age group between 30-60 years.

➤ Male and female both included

● **EXCLUSION CRITERIA:**

- Any musculoskeletal disorder & pain limiting movements of affected arm.
- Any other neurological and psychiatric conditions.
- Any skin allergies
- Any cognitive and perception disorder such as (unilateral neglect, apraxia).

● **MATERIAL TO BE USED:**

- Consent form
- Plinth
- Goniometer
- IASTM Tool(blade)
- Lubricant (Vaseline)
- Disinfectant

METHOD: Based on inclusion and exclusion criteria, 20 patients were included in the study. Written informed consent was obtained from all the patients who agreed to participate. Demographic data and a modified Tardieu scale were used as pre- and post-intervention measurements to assess spasticity in subacute and chronic stroke patients, and they were randomly allocated in a 1:1 ratio to Group A and Group B.

Group A: Conventional Physiotherapy with IASTM technique treatment protocol

Group B: Conventional Physiotherapy

● **IASTM technique treatment protocol:**

- Patient will be supine on plinth, elbow rested on a plinth comfortably. A lubricant (Vaseline) was applied to the skin around the biceps area prior to treatment and the IASTM tool was cleaned with an alcohol pad. First, the IASTM tool will used to find the exact areas of restriction in the elbow flexors. Then the IASTM tool will used, at an angle of 45° to apply slow strokes along the muscle, without causing any is comfort or pain, from the muscle origin to its insertion (sweeping technique), for approximately 5-7 minutes.

● **Conventional Physiotherapy protocol:**

- Proprioceptive neuromuscular facilitation (PNF) stretching with resisted isometric contraction, passive range of motion exercises, Cryotherapy was given for 40 minutes in both the groups.

OUTCOME

● **MODIFIED TARDEIU SCALE:**(ICC = 0.847)^[13]

- **Procedure:** Each patient was tested by the therapist. For elbow flexors muscles evaluation, the subjects were made to sit on a chair with shoulder adduction. A universal goniometer was used for the test procedure. The lateral epicondyle of the humerus was marked with a marker pen, and a point was marked on the acromion process for reference. The first line was drawn joining these two points and the second line was drawn from the radial head to the radial styloid process, after positioning of the axis over the lateral epicondyle of humerus with stabilizing arm along the first line and movable arm along the second line. The goniometer was fixed by two Velcro around the arm and forearm. During this manoeuvre, R1, R2, and MTS grading were measured.

Grade	Description
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0	No resistance throughout the course of the passive movement.
1	Slight resistance throughout the course of the passive movement, with no clear catch at a precise angle.
2	Clear catch at a precise angle, interrupting the passive movement, followed by a release.
3	Fatigable clonus (<10 seconds when maintaining pressure) occurring at a precise angle.
4	Infatigable clonus (>>10 seconds when maintaining pressure) occurring at a precise angle.
5	Joint is immovable.

STATISTICAL ANALYSIS AND RESULT:

- Statistical analysis for the present study was done manually and using SPSS software version 21. Comparison of pre-test and post-test scores of MTS in both groups was done by using a paired t-test, and between-group comparison of both groups was done by using an unpaired t-test.

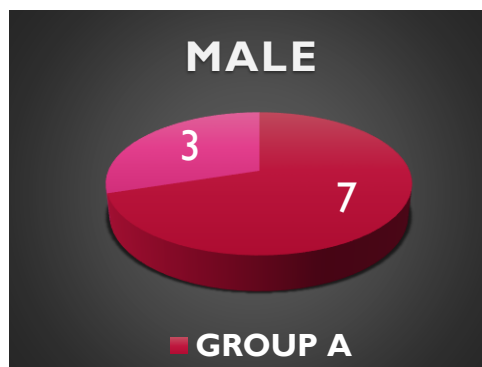
TABLE 1: BASELINE DATA OF BOTH GROUP

	GROUP A		GROUP B		T-VALUE	P VALUE
	MEAN	SD	MEAN	SD		
AGE	49	7.43	54.5	11.33	-1.28	0.216
HEIGHT	163.6	5.89	163.2	8.77	0.12	0.906
WEIGHT	57.8	5.32	60.9	6.87	-1.12	0.274
BMI	21.64	2.25	22.84	1.77	-1.32	0.202

TABLE 2: GENDER DISTRIBUTION IN BOTH GROUP

	GROUP A	GROUP B
MALE	7	3
FEMALE	8	2

GRAPH 1: MALE GENDER DISTRIBUTION IN BOTH GROUP



GRAPH 2: FEMALE GENDER DISTRIBUTION IN BOTH GROUP

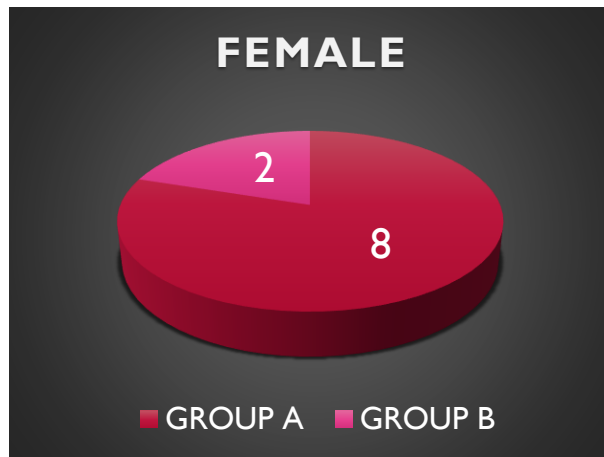


TABLE 3: WITHIN GROUP-A & B COMPARISON OF MTS:

		MEAN	SD	T-VALUE	P VALUE
GROUP A	PRE	47.1	5.34	-5.13	0.001
	POST	56.9	3.98		
GROUP B	PRE	49.2	3.42	-1.96	0.08
	POST	49.5	3.4		

Interpretation: Paired t-test was used for within group comparison of Group -A(T= -5.13, P= 0.001) and Group-B(T= -1.96, P=0.08) respectively which indicates there was significant improvement in Group -A.

GRAPH 3: MEAN OF MTS WITHIN GROUP-A & B

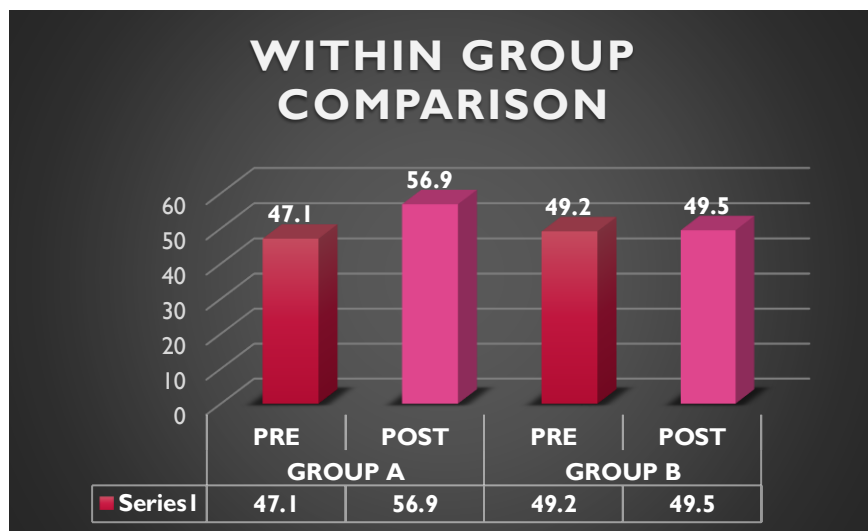
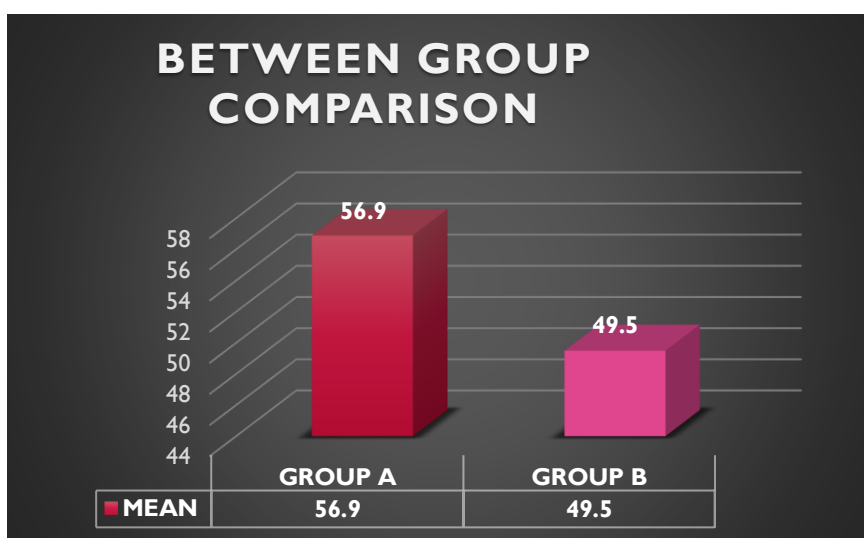


TABLE 4: BETWEEN GROUP-A & B COMPARISON OF MTS

	MEAN	SD	T-VALUE	P VALUE
GROUP A	56.9	3.98	4.46	0
GROUP B	49.5	3.4		

Interpretation: unpaired t-test was used for between group comparison of Group -A and Group -B the p- value (<0.05), which indicates there was significant reduction in spasticity.

GRAPH 4: MEAN OF MTS BETWEEN GROUP-A & B



3. DISCUSSION

The Present study aimed to study the immediate effect of IASTM with conventional therapy on upper limb spasticity in stroke patients.

Stroke is a quickly growing clinical manifestation of localised brain function disruption that lasts for 24 hours or longer and has no obvious explanation other than vascular origin.^[1] Motor deficits on one side, discomfort, muscular weakness, abnormal tone in which spasticity is more common.^[2] **Wissel et al.** found that spasticity most commonly developed in the elbow (79%), wrist (66%), ankle (66%), and shoulder (58%).^[7]

In the present study, mean age of the study population was middle-age group. **Jani B et al.** states that Aging leads to structural and functional changes in the blood vessel walls causing increased arterial wall stiffness where vascular distensibility was decreased, which may reduce cerebral blood flow and increased heart work load . so, the prevalence was higher with increasing age.^[11] Due to the protective effect of oestrogen on cerebral circulation. so, the prevalence of stroke was higher found in males than females.

In the current study to reduce hyper excitability of the tissues, IASTM tool, Hold-Relax technique of PNF, range of motion exercises and cryotherapy was given to the spastic stroke patients.

IASTM gave an inhibitory effect on spastic muscles, which might have cause similar effect as that of prolonged firm pressure and slow stroking, leads to inhibition of motor neuron pool. Another probable reason for reduction of spasticity can be, the pressure is given by an instrument, which might have given more deep pressure as compared to manual techniques.

Moreover, Recent studies in stroke demonstrated inhibitory impact on hyperactive muscle using EMG measures with IASTM on reciprocal inhibition reveals promising effect of neuromuscular imbalance between reduced antagonist activation and facilitate agonist of lower limb muscles which can enhance gait function.^[9] **Shruti et al.** showed significant difference in muscle tone and functional improvement of UE executing IASTM.^[12] **Dina et al.** found that IASTM with conventional physiotherapy treatment was improves hamstring muscle flexibility in diplegic cp children.^[13]

So, the current study supports alternative hypothesis of the study which shows there is significant reduction on upper limb spasticity in stroke patients treated with IASTM technique.

4. CONCLUSION

- The present study shows significant reduction in upper limb spasticity in stroke patients, hence IASTM with conventional therapy should be considered as an effective modality to reduce spasticity of upper limb in stroke rehabilitation on a regular basis.

FUTURE SCOPE:

To conduct this study with large sample size and apply for long duration.

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