Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

Comparative Effects of Low-Frequency Neuromuscular Electrical Stimulation and Percussive Mechanical Stimulation on Upper Limb Function and Spasticity in Post-Stroke Patients

Protocol summary

Study aim

To compare the effects of low-frequency neuromuscular electrical stimulation (5 Hz) and percussive mechanical stimulation (50–60 Hz) on upper limb function and spasticity in post-stroke patients.

Design

Randomized Clinical Trial (RCT) with two parallel intervention groups.

Settings and conduct

The study will be conducted at Surraya Azeem (Waqf) Hospital, Lahore. Data will be collected from eligible post-stroke patients, who will be randomly allocated into two intervention groups and will receive the assigned intervention along with conventional treatment.

Participants/Inclusion and exclusion criteria

Participants aged 40–70 years, of either sex, with a history of stroke for more than 4 months, Brunnstrom Recovery Stage 2–5, confirmed upper-limb spasticity with a Modified Tardieu Scale score >1, and an upper-limb Fugl-Meyer Assessment score of 1–50 will be included. Patients with an implanted electronic device (e.g., pacemaker), upper-limb fracture, traumatic brain injury, transient ischemic attack, severe cognitive impairment, or a history of epilepsy will be excluded.

Intervention groups

Group A will receive low-frequency NMES at 5 Hz, applied to the upper-limb extensor muscle group. Group B will receive percussive mechanical stimulation at 50–60 Hz, also applied to the upper-limb extensor muscle group. Both groups will receive conventional treatment including ROM, strengthening, PNF patterns, and gait training.

Main outcome variables

1. Upper limb spasticity — Modified Tardieu Scale (MTS) 2. Upper limb motor function — Fugl-Meyer Assessment (FMA) 3. Fine motor skills — Nine-Hole Peg Test (NHPT) 4. Gross motor skills — Box and Block Test (BBT) 5. Activities of daily living — Barthel Index

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20260715070206N1**
Registration date: **2026-10-03, 1405/07/11**
Registration timing: **registered_while_recruiting**

Last update: **2026-10-03, 1405/07/11**
Update count: **0**

Registration date

2026-10-03, 1405/07/11

Registrant information

Name
Rimsha Irshad Ali
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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2026-08-25, 1405/06/03

Expected recruitment end date

2026-10-31, 1405/08/09

Actual recruitment start date

2026-09-25, 1405/07/03

Actual recruitment end date

2026-10-31, 1405/08/09

Trial completion date

2027-01-31, 1405/11/11

Scientific title

Comparative Effects of Low-Frequency Neuromuscular Electrical Stimulation and Percussive Mechanical Stimulation on Upper Limb Function and Spasticity in Post-Stroke Patients

Public title

Comparing NMES and Percussion Therapy for Improving Arm Movement After Stroke

Purpose

Treatment

Inclusion/Exclusion criteria

Inclusion criteria:

40 to 70 years of age. Both male and female genders were included Patient with UE-fugl meyer assessment score 1 to 50. Stroke duration greater then 4 month subacute or chronic Patient must present with upper limb brunnstrom recovery stage 2 to 5. Confirmed Upper limb spasticity by modified tardieu scale >1

Exclusion criteria:

Implanted electronic device (pacemaker). Fracture of upper limb. Traumatic brain injury. Transient ischemic attack. Severe cognitive impairment on mini mental scale History of Epilipsy

Age

From **40 years** old to **70 years** old

Gender

Both

Phase

2

Groups that have been masked

- Participant

Sample size

Target sample size: **34**

Actual sample size reached: **34**

Randomization (investigator's opinion)

Randomized

Randomization description

Simple randomization will be used. Sealed opaque envelopes containing group allocation (Group A or Group B) will be prepared, shuffled, and numbered sequentially. Each participant will pick one envelope after baseline assessment, which will be opened by an independent researcher to reveal group allocation. Allocation concealment will be ensured through opaque, sealed, and sequentially numbered envelopes. The outcome assessor will remain blinded to group allocation.

Blinding (investigator's opinion)

Single blinded

Blinding description

Single-blinded. The outcome assessor will be blinded to group allocation. Participants and therapists cannot be blinded due to the nature of the interventions.

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Research ethics and support committee of University of Management and technology, Lahore

Street address

C-II, Johar town, Lahore

City

Lahore

Postal code

54000

Approval date

2026-09-25, 1405/07/03

Ethics committee reference number

RE-181-2026

Health conditions studied

1

Description of health condition studied

Chronic stroke (cerebrovascular accident) is a neurological condition resulting from interruption of blood flow to the brain, which may lead to persistent impairments in motor function, balance, coordination, mobility, and activities of daily living. This study focuses on individuals with chronic stroke undergoing rehabilitation.

ICD-10 code

I64

ICD-10 code description

Stroke, not specified as haemorrhage or infarction

Primary outcomes

1

Description

upper limb function

Timepoint

Before intervention, After intervention

Method of measurement

Fugl-Meyer Assessment Upper Extremity (FMA-UE)

2

Description

Spasticity

Timepoint

before intervention, after intervention

Method of measurement

Modified Tardieu Scale (MTS)

Secondary outcomes

1

Description
gross manual dexterity
Timepoint
before intervention, after intervention
Method of measurement
Box and Block test

2

Description
Fine manual dexterity
Timepoint
before intervention, after intervention
Method of measurement
9- Hole peg test

3

Description
Activity of Daily Livings
Timepoint
before intervention, after intervention
Method of measurement
barthel index

Intervention groups

1

Description
Intervention group: Participants in the low-frequency neuromuscular electrical stimulation (NEMS) group will receive NEMS at a frequency of 5 Hz in addition to conventional physiotherapy. Stimulation will be delivered using symmetric biphasic pulses with a pulse width of 200 µs, a ramp time of 4 seconds, an ON time of 20 seconds, and an OFF time of 10 seconds. Surface electrodes will be placed over the motor points of the target extensor muscles, including the wrist extensors, finger extensors, and triceps brachii. The stimulation will be applied for approximately 5 minutes to each target muscle, with a total intervention duration of 60 minutes per session. Participants will receive three sessions per week for four weeks, for a total of 12 sessions. Conventional physiotherapy, including range-of-motion exercises, strengthening exercises, PNF patterns, and gait training, will be provided alongside the intervention.
Category
Rehabilitation

2

Description
Intervention group: Participants in the percussive mechanical stimulation group will receive percussive mechanical stimulation at a frequency of 50–60 Hz in addition to conventional physiotherapy. The stimulation will be applied perpendicular to the muscle belly near the distal tendon insertion of the target extensor muscles, including the wrist extensors, finger extensors, and triceps brachii. Each target muscle will receive approximately 30 seconds to 3 minutes of percussive stimulation, with a total intervention duration of 60 minutes per session. Participants will receive three sessions per week for four weeks, for a total of 12 sessions. Conventional physiotherapy, including range-of-motion exercises, strengthening exercises, PNF patterns, and gait training, will be provided alongside the intervention.
Category
Rehabilitation

Recruitment centers

1

Recruitment center
Name of recruitment center
Surraya azeem hospital
Full name of responsible person
Dr. fawad noor
Street address
5 Bahawalpur road, chowk chauburji, Lahore
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lahore
Postal code
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Phone
+92 323 4598685
Email
doctor_4who@yahoo.com
Web page address
https://surrayaazeem.org/

Sponsors / Funding sources

1

Sponsor
Name of organization / entity
University of managment and technology
Full name of responsible person
Dr. sajjad Ali
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Raiwand road , lahore
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Sajjad.ali@umt.edu.pk
Grant name
Grant code / Reference number
Is the source of funding the same sponsor organization/entity?
No
Title of funding source
Self-funded by the investigator

Proportion provided by this source
100
Public or private sector
Private
Domestic or foreign origin
Domestic
Category of foreign source of funding
empty
Country of origin
Type of organization providing the funding
Persons

Person responsible for general inquiries

Contact
Name of organization / entity
University of managment and technology
Full name of responsible person
RIMSHA
Position
student
Latest degree
Bachelor
Other areas of specialty/work
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Person responsible for scientific inquiries

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Person responsible for updating data

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Physiotherapy
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Province
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54000
Phone
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Email
rimshairshad942@gmail.com

Sharing plan

Deidentified Individual Participant Data Set (IPD)
No - There is not a plan to make this available
Justification/reason for indecision/not sharing IPD
Deidentified individual participant data will not be shared publicly due to participant privacy and confidentiality considerations.
Study Protocol
No - There is not a plan to make this available
Statistical Analysis Plan
Undecided - It is not yet known if there will be a plan to make this available
Informed Consent Form
No - There is not a plan to make this available
Clinical Study Report
Undecided - It is not yet known if there will be a plan to make this available
Analytic Code
No - There is not a plan to make this available
Data Dictionary
No - There is not a plan to make this available