

Clinical Trial Protocol

Iranian Registry of Clinical Trials

02 Aug 2026

Effect of Neuromuscular and Neurofeedback Training on Balance and Plantar Pressure Variables of Table Tennis Players with Chronic Ankle Instability

Protocol summary

Study aim

The aim of this study is to determine the effect of neurofeedback and neuromuscular training on fluctuations in the center of pressure, balance and proprioception sense of the ankle joint in table tennis players with chronic ankle instability.

Design

Double Blind Randomized Clinical Trial

Settings and conduct

A total of 30 elite male table tennis players with chronic ankle instability were randomly assigned to two groups of neuromuscular training and combination training (neurofeedback + neuromuscular) and do exercises related to their group for eight weeks. Pre-test and post-test (after eight weeks of training) data were recorded and will be analyzed.

Participants/Inclusion and exclusion criteria

The inclusion criteria in this study were based on the International Ankle Consortium. Inclusion criteria for CAI subjects' disorders were acute ankle sprain leading to swelling, pain, and loss of functional activity for at least one day, giving way at least twice in the past six months, getting a score of less than 24 on the Cumberland Ankle Instability Tool, and getting a score of more than 5 on the ankle instability instrument. All participants in this study were members of the national team or champions in different age categories of adolescents, youth and adults. Exclusion criteria were lower limb injury, back pain or concussion in the six months prior to the study, neurological and postural disorders, history of fracture or lower limb surgery, and history of taking anti-depressants, anti-anxiety drugs and narcotics. An orthopedic specialist performed examinations to confirm participants' chronic ankle instability for the study.

Intervention groups

Neuromuscular group Combination (neuromuscular with neurofeedback) group

Main outcome variables

Neuromuscular and Neurofeedback Training

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20211018052799N1**

Registration date: **2021-12-01, 1400/09/10**

Registration timing: **retrospective**

Last update: **2021-12-01, 1400/09/10**

Update count: **0**

Registration date

2021-12-01, 1400/09/10

Registrant information

Name

Masoud Azizian

Name of organization / entity

The University of Bu-ali sina Hamedan

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2021-10-23, 1400/08/01

Expected recruitment end date

2021-11-22, 1400/09/01

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

Effect of Neuromuscular and Neurofeedback Training on Balance and Plantar Pressure Variables of Table Tennis Players with Chronic Ankle Instability

Public title

Effect of Neuromuscular and Neurofeedback Training on Chronic Ankle Instability

Purpose

Screening

Inclusion/Exclusion criteria**Inclusion criteria:**

One year before the present intervention, they suffered from lateral ankle sprain injury. Activity of the participants. A score of 24 or higher on the Cumberland Questionnaire (Ankle Instability Assessment Tool)

Exclusion criteria:

No surgery, fractures or serious injuries to the ankle and lower limbs. No cardiovascular and respiratory diseases No smoking Lack of pes planus, pes cavus and hallux valgus Absence of deformity in the thoracic, cervical, pelvic, lumbar and lower extremities Lack of diabetes and diseases related to peripheral nerves No history of using any type of shoe or medical shoe, Do not use artificial limbs on the femur, knee and ankles

Age

From **18 years** old to **25 years** old

Gender

Male

Phase

N/A

Groups that have been masked

- Participant
- Data analyser

Sample size

Target sample size: **30**

Randomization (investigator's opinion)

Randomized

Randomization description

Participants were randomly divided into two groups of 15 people (neurofeedback and neuromuscular) and neuromuscular group using Random Number Generator software.

Blinding (investigator's opinion)

Double blinded

Blinding description

In this study, both the examiner and the participants were blind. Because participants in both groups were performing neuromuscular exercises, as well as being unaware of the other group and the application of the protocol in the other group, they assumed that the main protocol was being applied to them. Also, the examiner was not aware of the existence of different interventions and which group each participant was in

Placebo

Not used

Assignment

Parallel

Other design features**Secondary Ids**

empty

Ethics committees**1****Ethics committee****Name of ethics committee**

Research Ethics Committees of Bu Ali Sina University-Hamedan

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Bu-Ali Sina University, Shahid Mostafa Ahmadi Roshan Street, Hamedan

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Approval date

2021-10-13, 1400/07/21

Ethics committee reference number

IR.BASU.REC.1400.037

Health conditions studied**1****Description of health condition studied**

Chronic ankle instability

ICD-10 code

M25.37

ICD-10 code description

Other instability, ankle and foot

Primary outcomes**1****Description**

Variables derived from floor pressure system data (pressure foot) - static balance - dynamic balance - Proprioception

Timepoint

Pre test_ Post test

Method of measurement

Plantar pressure system data (pressure foot)_ Biodex balance system_ Electrogoniometer

Secondary outcomes**1****Description**

Quality of Life Questionnaire

Timepoint

Anxiety and Depression Questionnaire

Method of measurement

Questionnaire

Intervention groups**1****Description**

Intervention group: Intervention group: Neuromuscular rehabilitation protocol was performed for 8 weeks 3 sessions per week for 30 minutes in each session. This training program, this exercises include One -legged knee flexion on three surfaces: flat, uneven surface and on balance board Toe stand with the help of the hand and without the help of the hand One-legged stand on three flat surfaces, uneven surface with eyes closed and on balance board Runner's pose on three flat surfaces, uneven surface with eyes closed and on balance board Cross-legged sway with the help of the hand, without the help of the hand, without the help of the hand with the eyes closed and on balance board and Toe walk

Category

Rehabilitation

2**Description**

Intervention group: The neurofeedback training was performed using an 8-channel ProComp Infiniti device (ProComp Infiniti Procomp2 thought technology co ltd. Canada) and the Biograph infiniti version 5.0 software. Prior to training protocol, the neurofeedback specialist gave the patients a complete explanation of the components of the neurofeedback device and all the components that make this treatment method more effective. Prior to each training session, noise-causing devices or artifacts such as rings, belts, cell phones and bank cards were placed away from the training area. The treatment protocol of the present study was performed for 8 weeks, 3 sessions per week and each session for 30 minutes . The patient would sit comfortably on a chair to perform the training protocol. Neurofeedback specialist identified 10-20 O1 and O2 points based on the international system, then the area and earlobe were cleansed with medical alcohol and Nuprep exfoliating gel (Nuprep, Weaver, USA). Then, the active electrode on the O1 region and the reference electrode on the O2 region were glued by Ten20 conductive paste (Weaver, USA) and the ground electrode was placed on the right ear .

Category

Rehabilitation

Recruitment centers**1****Recruitment center****Name of recruitment center**

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Web page address<https://basu.ac.ir>**Grant name****Grant code / Reference number****Is the source of funding the same sponsor organization/entity?**

Yes

Title of funding source

Bu Ali Sina university ethics committee in research

Proportion provided by this source

100

Public or private sector

Public

Domestic or foreign origin

Domestic

Category of foreign source of funding

empty

Country of origin

Type of organization providing the funding
Academic

Person responsible for general inquiries

Contact

Name of organization / entity

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Full name of responsible person

Ali Yalfani

Position

professor

Latest degree

Ph.D.

Other areas of specialty/work

Rehabilitation management

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Sharing plan

Deidentified Individual Participant Data Set (IPD)

Yes - There is a plan to make this available

Study Protocol

Yes - There is a plan to make this available

Statistical Analysis Plan

Not applicable

Informed Consent Form

Yes - There is a plan to make this available

Clinical Study Report

Yes - There is a plan to make this available

Analytic Code

Yes - There is a plan to make this available

Data Dictionary

Not applicable

Title and more details about the data/document

Data files measured by testers will be shared after the
study if needed.

When the data will become available and for how long

Start the course one year after the publication of results
and articles

To whom data/document is available

Researchers and researchers whose field of work is
similar to the present research and are employed in
universities

Under which criteria data/document could be used

The data of the present study will be provided to other
researchers only for comparison with future studies and
the use of data and their analysis is not allowed.

From where data/document is obtainable

Email adress m.azizian@phe.basu.ac.ir Phone number:
00989188157747

What processes are involved for a request to access data/document

A full description of the research should be provided and the details of the use of the data should be fully described.

Comments