Clinical Trial Protocol
Iranian Registry of Clinical Trials

09 Oct 2026

Acute effects of plyometric-dynamic stretching sequencing on athletic and neuromuscular performance in soccer players: A randomized crossover trial

Protocol summary

Study aim

Comparing two sequences of dynamic stretching and plyometric drop jumps on athletic and neuromuscular performance in amateur soccer players.

Design

Randomized, double-blind, three-arm crossover trial, phase not applicable, on 20 soccer players. Randomization using randomizer.org with allocation concealment by sealed opaque envelopes.

Settings and conduct

This randomized three-arm crossover trial on 20 amateur soccer players in Türkiye compared DS+DJ, DJ+DS, and control conditions across separate sessions. Outcome assessors and data analysts were blinded.

Participants/Inclusion and exclusion criteria

Inclusion: Male soccer players, 18-25 years, amateur competitive level, ≥3 training sessions/week + 1 match/week, forward/midfielder/full-back, ≥6 months training, no lower limb injury in last 3 months. Exclusion: Goalkeepers, central defenders, active musculoskeletal injuries, performance-enhancing supplements, unable to complete sessions, contraindicated medical conditions.

Intervention groups

DS+DJ group: After a 5-minute standard warm-up, participants performed dynamic stretching (2 leg swing exercises, 15 repetitions each) followed by 3 plyometric drop jumps from an individualized box height (30-50 cm). DJ+DS group: After a 5-minute standard warm-up, participants performed 3 plyometric drop jumps from an individualized box height (30-50 cm) followed by dynamic stretching (2 leg swing exercises, 15 repetitions each). Control group (CC): After a 5-minute standard warm-up, participants rested passively in a seated position for 5 minutes with no additional exercises.

Main outcome variables

L-drill maneuverability time; RSA total time; RSA fatigue index; 10m linear sprint time; CMJ height; standing broad jump distance

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20230612058457N9**
Registration date: **2026-05-23, 1405/03/02**
Registration timing: **retrospective**

Last update: **2026-05-23, 1405/03/02**
Update count: **0**

Registration date

2026-05-23, 1405/03/02

Registrant information

Name

Mohammad Alimoradi

Name of organization / entity

Shahid Bahonar University

Country

Iran (Islamic Republic of)

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2026-03-16, 1404/12/25

Expected recruitment end date

2026-03-29, 1405/01/09

Actual recruitment start date

2026-03-16, 1404/12/25

Actual recruitment end date

2026-03-29, 1405/01/09

Trial completion date

2026-05-03, 1405/02/13

Scientific title

Acute effects of plyometric-dynamic stretching sequencing on athletic and neuromuscular performance in soccer players: A randomized crossover trial

Public title

Comparison of the sequencing of plyometric exercises and dynamic stretching on athletic and neuromuscular performance in soccer players

Purpose

Supportive

Inclusion/Exclusion criteria

Inclusion criteria:

Male soccer players aged 18 to 25 years Competed at the university or competitive amateur club level Completed a minimum of three training sessions and one match per week Played in one of the following field positions: forward, midfielder, or full-back Had at least six months of structured soccer training Reported no lower limb injuries in the preceding three months

Exclusion criteria:

Being a goalkeeper Being a central defender (due to distinct physical demands) Having current musculoskeletal injuries Using performance-enhancing supplements (e.g., creatine, beta-alanine, anabolic agents) Being unable to complete all testing sessions Having any medical condition that contraindicated maximal exercise

Age

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

Gender

Male

Phase

N/A

Groups that have been masked

- Outcome assessor
- Data analyser

Sample size

Target sample size: **20**

Actual sample size reached: **20**

Randomization (investigator's opinion)

Randomized

Randomization description

In this randomized crossover trial with three experimental conditions (DS+DJ, DJ+DS, and CC), the randomization sequence was generated by an independent researcher using randomizer.org software employing a balanced Latin square design to ensure that each condition appeared equally often in the first, second, and third positions across participants. The unit of randomization was individual, and no stratification was used. For allocation concealment, the generated sequences were placed in sequentially numbered, opaque, sealed envelopes, which were opened by the intervention deliverer only after completion of the standard warm-up and immediately before delivery of the experimental intervention. It should be noted that no quasi-randomization methods (such as allocation based on birth date or odd/even numbers) were used in this study.

Blinding (investigator's opinion)

Double blinded

Blinding description

Due to the nature of the exercise interventions, participants and the intervention deliverer could not be blinded to condition allocation. However, outcome assessors responsible for administering performance tests and recording measurements were blinded to condition allocation, and data analysts were also blinded until the completion of the primary statistical analysis. Therefore, this study is considered double-blind.

Placebo

Not used

Assignment

Crossover

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Ethics Committee of Vasile Alecsandri University of Bacău

Street address

Calea Mărășești 157, 600115 Bacău, Romania

City

Bacău

Postal code

600115

Approval date

2026-02-09, 1404/11/20

Ethics committee reference number

Decision No. 9/2/09.02.2026

Health conditions studied

1

Description of health condition studied

Athletic Performance

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

Agility

Timepoint

Pre-test (before intervention) and post-test (immediately after 2 minutes of rest following the intervention)

Method of measurement

Timing gates (Speedlight, Swift Performance, Australia) placed at hip height (0.7 m) to align with the center of mass at the start/finish line. The participant began from a stationary two-point staggered stance with the front foot placed 0.5 m behind the start gate to prevent premature triggering. Time was recorded in seconds. Participants completed two maximal efforts with 2 minutes of passive recovery between attempts. The best (fastest) completion time was recorded.

2

Description

Repetetive speed ability total time

Timepoint

Pre-test (before intervention) and post-test (immediately after 2 minutes of rest following the intervention)

Method of measurement

Six bouts of 10-meter sprints (including 5 meters straight and 5 meters with a 45° cut) with 25 seconds of passive recovery between each bout. Standing start. Timing gates (Speedlight, Swift Performance, Australia) were positioned at the start line (0 m) and the finish line (10 m total distance). Total time was calculated as the sum of all six sprint times and recorded in seconds.

3

Description

Repetetive speed ability fatigue index

Timepoint

Pre-test (before intervention) and post-test (immediately after 2 minutes of rest following the intervention)

Method of measurement

Calculated using the formula: [(Total time / Ideal time) - 1] × 100. Ideal time was defined as the fastest sprint time multiplied by six. The result was reported as a percentage (%).

4

Description

10m linear sprint

Timepoint

Pre-test (before intervention) and post-test (immediately after 2 minutes of rest following the intervention)

Method of measurement

Timing gates were positioned at the start line and the 10-meter mark. The participant began from a stationary upright two-point staggered start with the front foot placed 0.5 m behind the start gate to prevent premature triggering. Time was recorded in seconds. Participants completed two maximal attempts with 2 minutes of passive recovery between trials. The best (fastest) time was recorded.

5

Description

Countermovement jump height

Timepoint

Pre-test (before intervention) and post-test (immediately after 2 minutes of rest following the intervention)

Method of measurement

An iPhone 15 running the My Jump 3 application (version 3.0.10, Carlos Balsalobre, Madrid, Spain) was used. Videos were recorded at 240 frames per second using the iPhone 15's slow-motion capture mode from the sagittal plane. The participant stood upright with hands placed on the hips to eliminate arm swing assistance. The movement consisted of a rapid, maximal vertical jump preceded by a quick knee bend to approximately 90° of flexion, performed in a single seamless motion. Jump height was calculated using the formula $h = t^2 \times 1.22625$, where h is jump height in meters and t is flight time in seconds. Three maximal attempts were performed with 30 seconds of passive recovery between each attempt. The best (highest) jump height was recorded in centimeters.

6

Description

Standing broad jump distance

Timepoint

Pre-test (before intervention) and post-test (immediately after 2 minutes of rest following the intervention)

Method of measurement

The participant performed a horizontal jump from a standing start with a bilateral takeoff and landing. Arm swing was permitted. Landing distance was measured from the takeoff line to the nearest point of contact (heel) using a standardized measuring tape in centimeters. Three maximal attempts were performed, and the best distance was recorded.

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group: After 5 minutes of standard warm-up, the participant first performed dynamic stretching exercises consisting of two leg swing movements (anterior-posterior and medial-lateral), each with 15 repetitions per leg at a controlled rhythmic pace. Immediately after that, they performed three vertical drop jumps from a plyometric box at an individualized height between 30 and 50 cm. Then, 2 minutes of passive rest was given, followed by the performance testing battery.

Category

N/A

2

Description

Intervention group: After 5 minutes of standard warm-up, the participant first performed three vertical drop jumps from a plyometric box at an individualized height between 30 and 50 cm. Immediately after that, they performed dynamic stretching exercises consisting of

two leg swing movements (anterior-posterior and medial-lateral), each with 15 repetitions per leg at a controlled rhythmic pace. Then, 2 minutes of passive rest was given, followed by the performance testing battery.

Category
N/A

3

Description
Control group: After 5 minutes of standard warm-up, the participant rested passively in a seated position for 5 minutes with no additional dynamic stretching or plyometric exercises. Then, 2 minutes of passive rest was given, followed by the performance testing battery.

Category
N/A

Recruitment centers

1

Recruitment center

Name of recruitment center
Sivas Yolspor Soccer Club

Full name of responsible person
Mohammad Alimoradi

Street address
Unit 6, Yekta Complex, 12th Alley, Fathali Shahi Street.

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity
Vasile Alecsandri University

Full name of responsible person
Bogdan Antohe

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Grant name

Grant code / Reference number

Is the source of funding the same sponsor organization/entity?
Yes

Title of funding source
Vasile Alecsandri University

Proportion provided by this source
100

Public or private sector
Public

Domestic or foreign origin
Foreign

Category of foreign source of funding
Sponsor: country of origin

Country of origin
RO

Type of organization providing the funding
Academic

Person responsible for general inquiries

Contact

Name of organization / entity
Shahid Bahonar University

Full name of responsible person
Mohammad Alimoradi

Position
Graduated Student

Latest degree
Master

Other areas of specialty/work
Sport Medicine

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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
Yes - There is a plan to make this available

Informed Consent Form
Yes - There is a plan to make this available

Clinical Study Report
No - There is not a plan to make this available

Analytic Code
Yes - There is a plan to make this available

Data Dictionary
Yes - There is a plan to make this available

Title and more details about the data/document
All data will be shared after anonymizing individuals, ensuring their non-identifiability.

When the data will become available and for how long
The data access period will start immeduately after the results are printed.

To whom data/document is available
The data will be made available to researchers, organizations, and institutions related to the field of football and also for publication in accessible journals.

Under which criteria data/document could be used
In order to assist scientific research and promote the implementation of executive goals with a focus on reducing musculoskeletal injuries and enhancing the performance of football players in the field.

From where data/document is obtainable
Mohammad Alimoradi/malimoradisport@gmail.com

What processes are involved for a request to access data/document
Requests for access to data will be answered within a week

Comments